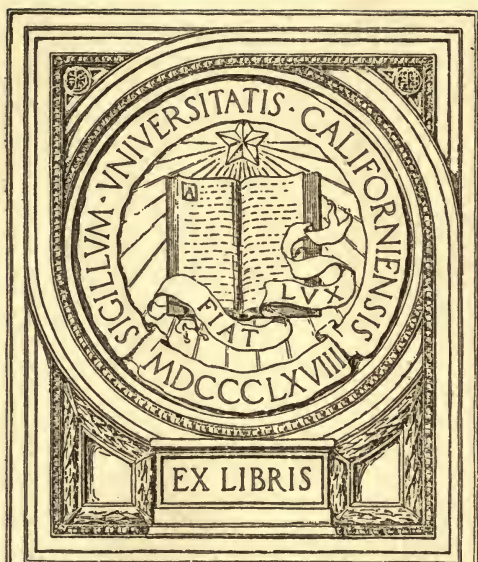


LANDSCAPE
GARDENING
AS APPLIED TO
HOME DECORATION



SAMUEL T. MAYNARD



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 531
 532



“Porte Cochère” or Covered Driveway.

Frontispiece.

Landscape Gardening

As Applied to Home Decoration

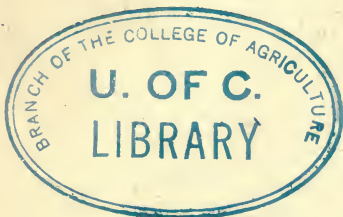
BY

Samuel T. Maynard

*Formerly Professor of Botany and Horticulture
at the Massachusetts Agricultural College*

Second Edition; Rewritten and Enlarged

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To the thousands of home-makers who are trying to beautify their homes and thus adding much to our already beautiful and prosperous country this little book is dedicated with the hope that it may aid many in the pursuit of knowledge of the most beautiful trees, shrubs, and plants and how to plant, train, and care for them so as to get the most enjoyment from their growth and cultivation.

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INTRODUCTION TO SECOND EDITION

THE great progress made in the past fifteen years in out-of-door house decoration, the large increase in the number of beautiful ornamental trees, shrubs, and plants from many parts of the world, and the very great increase in the "back to the country" movement, make it desirable that this little volume, which has met with such an appreciative reception, be revised and brought up to date. The Author has therefore revised and rewritten much of the text, replaced many of the old illustrations and added a great many new ones.

He has had the assistance of many specialists, whose advice will add much to the value of the volume.

He is especially indebted to Professor A. C. Beal, of the New York State College of Agriculture, at Cornell University, for the revision of the chapter on hardy herbaceous plants, roses, sweet peas, etc.; to Messrs. Chas. A. Green, Henry A. Dreer, Harlan P. Kelsey, "The Eastern Nurseries," and others for loan of cuts and assistance in obtaining them; to Mr. Frank A. Rugg for photographs, and to all who have so kindly assisted him in this revision.

INTRODUCTION TO FIRST EDITION

IN no country in the world are there so many well-to-do people as in the United States, and so many who own comfortable and even beautiful homes, and on every hand we hear the call for information as to the most beautiful decorative trees, shrubs, and plants and their proper use and arrangement to produce the most pleasing effects. The enormous trade in ornamental trees, shrubs, and plants among our nurserymen is an indication of the extent of the work of improvement and decoration that is going on among our people and the consequent need of knowledge and skill in order to make the best use of these materials.

The agricultural and horticultural press of the country has done much and is increasing its efforts to diffuse the needed knowledge. The nurserymen and dealers in ornamentals by their catalogues so profusely illustrated and scattered broadcast over the land are also helping on the good work, though in many cases by their undue praise of untried novelties they often lead the unskilled planter to make serious mistakes and suffer great loss.

Landscape gardeners and architects have played a large and important part in developing the great beauty seen in so many of our country and suburban towns; the great majority of our people, however, those in limited circumstances who are straining every effort to pay for the home they are building, are unable to avail themselves of their often costly advice, but must content themselves with obtaining from other sources such knowledge as will enable them to properly care for the ornamental trees, shrubs, or

plants that they may be able to procure, and to so group and combine them with the lawn, the dwelling and other buildings, and with the surrounding conditions as to make not only a beautiful home-picture, but also to harmonize with any beautiful homes or estates adjoining or near by, that the beauty may be as widespread as possible.

While thus supplying the above call for knowledge in a concise and practical way has been the central idea in the construction of this book, the instructions in the principles of growth and care, grouping and arrangement, underlying successful work in home ornamentation are equally adapted to the more extended work of decorating large estates, parks, and other public grounds, and some few hints are given as to the management of public squares, school-yards, cemeteries, the construction of country roads, and roadside improvements.

It has been the author's aim to give plain and simple descriptions of each tree, shrub, or plant recommended, to present those that are of real value under ordinary conditions, and to give full and careful direction as to soil best adapted to the growth of each, and the special care, training, pruning, etc., required for their best growth.

In presenting this book to the public it is with the view of supplying the knowledge so much needed and sought for in a practical, condensed form that shall enable the homeowner and -builder, occupied with the daily cares of business, to make beautiful his surroundings; and the author hopes that, after more than 40 years of experience in teaching and practising the art of ornamental gardening, he may be able to fill in a measure this long-felt want.

Many imperfections will, no doubt, be found in the work, for which kind indulgence and friendly criticism is asked, that such imperfections may be remedied in a revised edition at an early date.

S. T. M.

TABLE OF CONTENTS

	PAGE
INTRODUCTION.....	vii
CHAPTER I	
LANDSCAPE GARDENING AND HOME ORNAMENTATION.....	i
Advantages of Home Ornamentation. Natural <i>vs.</i> the Artificial System.	
CHAPTER II	
ORNAMENTING NEW HOMES.....	7
Conditions of Locations Considered. Secure and Improve Strongly Marked Natural Features. Location of Buildings. Architecture of the House. The Cellar and its Use. Heating and Ventilating the House. Good Water.	
CHAPTER III	
PREPARATION OF THE LAND.....	29
Grading. Making the Lawn. Fertilizing and Care of the Lawn.	
CHAPTER IV	
TREES—THEIR PLANTING AND CARE.....	44
Importance of Trees and Shrubs. Improving Old Trees. Preparation of Trees for Planting. Planting and Care of Trees. The Arrangement or Grouping. Rules for Grouping.	
CHAPTER V	
SHRUBS, HEDGES, AND HARDY CLIMBERS.....	82
Methods of Grouping. Preparation of Land and Planting. Pruning and Care of Shrubs. Hedges: their Importance. Pruning and Training Hedges. Hardy Woody-Climbers: their Importance. Planting and Care of Herbaceous Plants: their Importance and Use. Tender foliage or Flowering Plants.	

CHAPTER VI

WALKS AND DRIVES.....	PAGE 95
Importance. Extent, Width, and Distance. Construction.	

CHAPTER VII

RENOVATING AND IMPROVING OLD HOMES.....	104
Preserving and Improving Old Trees. Renewing Old Shrubs and Hedges. Renovating Old Lawns. Removal of Fences and Walls. Farm Home Decoration. Combine Decoration and Forestry. Fruit-trees for Ornaments. Construction of Farm Roads.	

CHAPTER VIII

COUNTRY ROADS AND ROADSIDE IMPROVEMENTS.....	119
Conditions Necessary for Good Roads. Broken Stone Roads. Repairing Roads. Care of Roadside Trees and Shrubs. Roadside Decoration.	

CHAPTER IX

PARKS, PUBLIC SQUARES, SCHOOL YARDS, ETC.....	124
Suggestions as to Parks, Public Squares, School-yard Decoration. Cemetery Decoration. Renovating Old Cemeteries. Back-yard Decoration.	

CHAPTER X

DESCRIPTION OF TREES.....	153
Street and Avenue Trees. Upright or Round-headed Trees. Weeping Trees. Trees with Deeply Cut Foliage. Trees with Colored Foliage.	

CHAPTER XI

EVERGREEN TREES.....	203
Importance in Home Ornamentation. Transplanting and Pruning. Best Varieties.	

Table of Contents

xiii

CHAPTER XII

PAGE

ORNAMENTAL SHRUBS.....	214
------------------------	-----

How to Use with Best Effect. Transplanting, Pruning, etc.
Best Varieties of Evergreen Shrubs. Importance of Climbing Shrubs. Best Varieties of Climbing Shrubs. Hedge Plants. Roses.

CHAPTER XIII

HARDY HERBACEOUS PLANTS, TENDER BEDDING AND CLIMBING PLANTS, ETC.....	273
---	-----

Transplanting and Care. Best Varieties. Tender Bedding Plants; Best Varieties. Tender Climbing Plants; Best Varieties. Sub-tropical Plants; Treatment; Best Varieties.

CHAPTER XIV

AQUATIC PLANTS, HARDY FERNS, AND ORNAMENTAL GRASSES...	306
--	-----

Soil and Cultivation for Aquatic Plants; Best Varieties. Aquatic Border Plants; Best Varieties. Hardy Ferns; Use and Care of; Best Varieties. Ornamental Grasses; Importance and Care of.

CHAPTER XV

INSECTS INJURIOUS TO ORNAMENTALS.....	320
---------------------------------------	-----

Amount of Injury done by Insects. Remedies and Preventives from Injury by Insects. Insecticides and their Use. Fungi Injurious to Ornamentals. Rusts, Smuts, Mildews, Blights, etc. Fungicides and their Use. Spraying Pumps and Nozzles and their Use.

CHAPTER XVI

THE HOME FRUIT GARDEN.....	349
----------------------------	-----

Amount and Kind of Land Needed. Location. Planting and Caring for Fruit-trees and Plants. Protection from Insects and Fungous Pests. The Best Varieties of Each Kind for Home Use.

LIST OF ILLUSTRATIONS

FIG.		PAGE
	Covered Drive-Way, Porte Cochère.....	<i>Frontispiece</i>
1.	Geometric or Artificial Decoration.....	4
2.	Natural Arrangement of Rocks.....	11
3.	Natural Arrangement of Rocks.....	12
4.	Unnatural Arrangement of Rocks.....	12
5.	Natural Water View.....	14
6.	Underground Overflow of Lakelet.....	15
7.	Open Overflow of Lakelet.....	15
8.	Building Arranged at One Side of Lot.....	18
9.	Method of Obtaining Grade.....	31
10.	Method of Obtaining Grade.....	31
11.	A "Well" about a Tree.....	31
12.	Covering Roots on One Side.....	32
13.	Improper Grading.....	34
14.	A Well-graded Lawn.....	35
15.	Grading to Rounded Surface.....	36
16.	Grading to Rounded Surface.....	36
17.	Grading to Rounded Surface.....	36
18.	House under Large Oak.....	46
19-20.	Trees as often Found by Roadside.....	47
21-22-23.	Trees as often Found by Roadside.....	48
24-25-26.	Pruning Roadside Trees.....	49
27.	Old Tree Cut Back.....	50
28.	Arrangement of Trees Along Narrow Roadway.....	53
29.	Screen or Wind-Break: Too Formal.....	64
30.	Trees in Natural Group for Screen.....	65
31.	Large-growing Trees in Center of Group.....	65
32.	Natural Grouping of Large and Small Trees.....	66
33.	Trees and Shrubs Arranged, Walk and Drive.....	68
34.	Trees and Shrubs Arranged, Walk and Drive.....	69
35.	Trees and Shrubs Grouped at Fork of Road.....	70
36-37.	Trees and Shrubs Grouped at End or Turn of Walk.....	71

FIG.	PAGE
38. Trees and Shrubs Grouped at Long, Many Radiating Lines Affording Vistas in Many Directions.....	72
39. Affording Vistas Under and Through Trees.....	73
40. Screen at Different Elevations.....	74
41. Vistas Through Trees, Shrubs and Plants.....	75
42. Vistas Through Trees, Shrubs and Plants.....	76
43. Groups of Trees at Entrance.....	77
44. Groups of Trees at Crown of Rounded Surface.....	78
45. Shrubs and Plants Banked Against Veranda.....	79
46. Cutting Back of Hedge.....	87
47. Result of Cutting Back Hedge-plants.....	87
48-49. Correct Forms of Hedges.....	88
50. Incorrect Form of Hedge.....	88
51. Where Cuts Should be Made in Pruning Shrubs.....	88
52. Vine-covered Cottage.....	91
53. Flagstones in Place of Gravel or Concrete.....	96
54. Combined Walk and Drive.....	98
55. Semi-circular Walk and Drive.....	98
56. Method of Obtaining Curves.....	100
57. Location of Tile in Draining Road-bed.....	102
58. Location of Tile in Draining Road-bed.....	102
59. The Result of Too Close Planting.....	105
60-61. Old Shrubs Divided and Pruned.....	106
62. Form of Shrubs.....	106
63. Covering Bank Wall.....	110
64. Turfing Against Wall.....	111
65. A Well-decorated Farm House.....	115
66. Section of Ordinary Country Road.....	121
67. Section of Macadam Road.....	121
68. A Properly Constructed Bar.....	122
69. An Improperly Constructed Bar.....	122
70. An Improperly Gravelled Roadbed.....	124
71. A Properly Gravelled Roadbed.....	124
72. Roadside Decorated at Entrance.....	127
73. A Roadside Picture.....	130
74. A Roadside Picture—Natural Growth, Well-Cared-for.....	131
75. Back-yard Picture.....	135
76. Decorated Well-curb.....	136
77. Back Porch Decorated Well-curb.....	139
78. Combined, Ornamental and Useful.....	140

List of Illustrations

xvii

FIG.	PAGE
79. Part of Fig. 78.....	140
80. A Substantial Village School House with an Abundance of Sunlight.....	142
81, 82, 83. Arrangement of School Yards.....	144
84. A Modern Cemetery—Weeping Willow, Aquatic Plants, etc..	146
85. City Street Without Trees.....	150
86. City Street Well Decorated with Trees.....	151
87. An Avenue of Elms.....	154
88. A Perfect Elm.....	156
89. Fringed Vase-formed Elm.....	157
90. Sugar Maple.....	158
91. Silver Maple.....	159
91'. Red Oak Pruned to make Branch High.....	161
92. Norway Maple.....	166
93. Japanese Maples.....	167
1. Red-Leaved.	
2. Cut-Leaved Weeping.	
3. Green-Leaved.	
94. Western Catalpa.....	171
95. Flowering Dogwood.....	172
96. English Hawthorn.....	174
97. Black or Italian Poplar.....	177
98. Lombardy Poplar.....	178
99. Magnolia Soulangeana.....	180
100. Oak-leaved Mountain Ash.....	184
101. White Oak.....	185
102. Pin Oak.....	186
103. Cut-leaved Maple.....	189
104. Cut-leaved Weeping Birch.....	191
105. Weeping Beech.....	192
106. Teas' Weeping Mulberry.....	193
107. Camperdown Elm.....	194
108. Fern-leaved Beech.....	197
109. Rivers' Purple Beech.....	200
110. Golden Elm, Weeping Birch, Chinese Catalpa.....	201
111. Douglas Fir, Stone Pine, Nordmann's Fir.....	204
112. Norway Spruce.....	205
113. Colorado Blue Spruce.....	206
114. Austrian Pine.....	207

FIG.	PAGE
115. Japanese Plumed Cypress (<i>Retinospera</i>)	208
116. Japanese Pea-fruited Cypress (<i>Retinospera</i>)	210
117. Groups of Arbor-vitæ and Flowering Apple	211
118. Author's Weed Killers	214
119. Japanese Azalea	217
120. <i>Calycanthus Floridus</i>	219
121. <i>Clethra Alnifolia</i>	220
122. Japanese Quince	222
123. <i>Weigela</i> (<i>D. rosea</i>)	224
124. <i>Exochorda Grandifolia</i>	225
125. Golden-bell	226
126. Hedge of Hardy Hydrangea	228
127. <i>Pterostyrax</i>	229
128. Mock Orange (<i>Philadelphus</i>)	230
129. White Fringe	231
130. Purple Fringe Smoke Tree	233
131. Stag-horn Sumac	234
132. Bridal Wreath	236
133. <i>Spiræa Van Houttei</i>	237
134. Common Lilac	238
135. Japanese Snowball	240
136. Bedding Roses	243
137. Moss Rose	244
138. Mixed Climbing Roses	245
139. Crimson Rambler	246
140. Japanese Rose (<i>Rosa rugosa</i>)	247
141. Dawson Climbing Rose	248
142. Mountain Laurel	251
143. <i>Rhododendron</i>	252
144. <i>Rhododendron</i> Prepared for Shipping	253
145. Vine-covered Cottage	254
146. American Woodbine	255
147. Japanese Woodbine, Boston Ivy	257
148. Japanese Clematis	258
149. Japanese Clematis, <i>Jackmanii</i> and <i>Henryi</i>	259
150. Japanese Honeysuckle	260
151. Chinese Wistaria	261
152. Kokwa Vine [†] <i>Actinidia</i>	262
153. Vine-covered Stable	264
154. Part of Stable Showing Fruit	265

List of Illustrations

xix

FIG.	PAGE
155. Privet Hedge.....	269
156. Unpruned Barberry Hedge.....	270
157. House with Vines, Herbaceous Plants in Foreground.....	271
158. White Day Lily.....	275
159. Japanese Iris.....	278
160. German Iris.....	279
161. Golden-banded Lily.....	282
162. Pæonia, Cut-leaved.....	284
163. Peony (<i>P. albiflora</i>).....	285
164. Phlox <i>Paniculata</i>	287
165. Oriental Poppy.....	288
166. <i>Yucca Filamentosa</i>	291
167. <i>Canna Indica</i>	301
168. Castor Bean.....	302
169. Egyptian Papyrus.....	303
170. An Aquatic Garden.....	307
171. East Indian Lotus.....	310
172. <i>Nymphæa rosea</i>	311
173. Water Poppy.....	313
174. Group of Hardy Ferns.....	316
175. Ornamental Grasses.....	318
176. <i>Eulalia</i> , Japanese Plume Grass.....	319
177. Elm Beetle.....	328
178. Elm Scale.....	330
179. Maple Borer.....	331
180. Canker Worm (Fall).....	333
181. Canker Worm (Spring).....	333
182. Round Headed Apple Borer.....	334
183. Flat Headed Apple Borer.....	334
184. Peach Borer.....	335
185. Rose Chafer.....	336
186. Rose Slug.....	336
187. Oyster Shell Scale.....	339
188. Maple Scale.....	342
189. Home Fruit Garden.....	350
190. Strawberry Bed.....	371

LANDSCAPE GARDENING

CHAPTER I

LANDSCAPE GARDENING AND HOME DECORATION COMPARED

THE term "landscape gardening" properly is applied in the more extended meaning of the words to that larger work of making and decorating extensive estates, parks, etc., where distant views (landscapes) may be obtained within their limits and by the work of the gardener or landscape artist.

Very little of this kind of work can be done in this country because of the small areas owned by most of our people, and the term "home decoration" or "home landscape gardening" will more properly apply to most of the work done among us in this line. Yet when we consider that outside the limits of cities and large towns there are large and extended views which even the owner of the smallest estate may take in or shut out in a measure at will in the arrangement of his own decorative trees and shrubs, the work of home decoration becomes in a true sense landscape gardening.

We can and do to a greater or less extent include the whole landscape in the decoration of all home grounds if we wish to obtain the best results. There is hardly a

country or suburban home so shut in as not to afford some scope for the appropriation of outside vistas of beauty beyond its limits, and in many cases views for miles around may be found and improved or toned down or heightened by careful treatment in our own planting; and in more closely planted districts, by mutual understanding and cooperation, the real art of landscape gardening may have as broad scope as in the park and large estate.

Knowledge of Materials

Before considering so large a subject in detail, the necessity must be urged upon the reader of becoming thoroughly familiar with the materials to be used—i.e., the ornamental trees, shrubs, plants, grass, rock, and style of building to a certain extent—for until this knowledge is obtained it will be a very difficult matter to begin the work understandingly or to carry it out to successful results.

In Chapter X will be found a brief description of the most beautiful trees, shrubs, and plants, their most appropriate use, the soil best suited to their growth, the special treatment they each require, and in Chapter XV the diseases and insect pests they are subject to, with remedies for the same. Frequent reference will be made to these chapters, and for a full understanding of each case it will be advisable to give these references full consideration.

A Plan

Before any one, skilled or unskilled, begins to decorate a place, no matter how small, he must have some plan for the work, and the more complete and fully matured that plan the better.

Many individuals who have a special love for the beautiful in nature, who are familiar with a large number of the

most beautiful trees, shrubs, etc., and have studied the effects of their varying forms, size and colors, and who are about to build a home, are qualified to make a satisfactory plan for themselves, and a large amount of pleasure may be the result of this work.

This study of art and nature is one of the best kinds of training of the perceptive faculties. Nothing can better train the eye and thoughts to see and love the beautiful than this work, and it has a most refining and elevating effect upon those who thus spend their leisure hours.

If proper time is given to the subject, and the advice of those who have had some experience is sought, there need be no difficulty in making a good working plan by the amateur. The father and the mother should both be interested and plan together, and the children too should have a voice in the matter, for there is nothing that holds them to the old home as the trees and plants they have planted or helped to plant and care for.

When cost is not an item of consideration, a complete plan made by a skilled landscape gardener who is willing to incorporate, as far as possible, the particular kinds of trees and plants and other features desired by the owner, will give the most satisfaction; but the value of the study and training to the individual is lost; therefore I would advise every home-builder to make a great effort to learn what are the best decorative trees, shrubs, and plants for home planting, and how best to succeed in growing them to the greatest perfection.

Some failures will be made, but success will at last crown our efforts, and the things we have planted, the walks and drives we have located, and the other objects of beauty we have created about our homes will be ours in a sense that they cannot be if we build after the plan of others, and a most precious source of joy and comfort in declining years.



FIG. 1.—The Geometrical or Artificial Arrangement of Shrubs and Plants.

The trees we plant may be a legacy that will last through many generations.

The Natural versus the Artificial System

In earlier times and in other countries much of the work in landscape or ornamental gardening was done in what is known as the *geometrical* or *artificial system* (Fig. 1), where the work was largely laid out in squares, circles, or other geometrical figures; the changes in grade were largely obtained by steep terraces, the trees and shrubs trained to regular and often grotesque forms. In our own country the *natural system* is more largely used, and more and more in Europe it is coming into use, where all the work is done so as to represent the best and most beautiful in nature. By this system the walks and drives are laid out in graceful curves, the changes in grade made by graceful slopes and rounded surfaces, and the trees and shrubs are encouraged to take the most perfect natural forms, while they are so grouped as to give the greatest variety of natural beauty.

Under some conditions, as in squares or city lots, close up to large, tall buildings, with paved roads and sidewalks, on steep hillsides and abrupt slopes, or where the terrace or retaining wall is a necessity, the artificial system may not be objectionable, but in the country, with so much of freedom of thought and action, and so full of natural growth and beauty, the artificial style is not in good taste and should generally be avoided. The house and surrounding buildings, walks, drives, fences, etc., must of necessity be artificial, but even these may be toned down in their architecture and coloring so as to blend and harmonize with the natural ornamental features about them.

New Homes and Homes Already Established

In considering the subject of home decoration it becomes necessary to discuss it under two heads: 1st. New homes where nothing has been done toward outside decoration; 2d. Homes already established.

CHAPTER II

ORNAMENTING NEW HOMES

IN establishing and decorating new homes the following important points must be considered: first, situation and natural features; second, location of buildings; third, plans of the home.

Situation and Natural Features

LOCATION

Everywhere about us, except in the heart of the large cities, are to be found building lots with more or less land for lawn and garden purposes. On hill and in dale, among the mountains, by the seaside, in the suburbs, and in the remote country, everywhere are places in such profusion that those of the most limited means, the most wealthy and of the most fastidious tastes, may find a location suited to their requirements.

Whether one shall locate a new home in the city, in the suburbs, or in the country is a question that cannot be answered without a complete understanding of all of the conditions involved. Each has its advantage, and every side of the question should be very carefully studied before a decision is made, for not only one's own personal welfare and happiness is involved, but in many cases that of others near and dear, and when once located a change cannot be made without a great inconvenience and in some cases great loss financially.

HEALTHFULNESS OF LOCATION

This is of the first and paramount importance, for without health no one can enjoy life or do his share toward making his own life or that of others of value. And first of all low and swampy or malarial land should be avoided. While much may be done by underdraining, and other means be employed to make such locations healthful, with so many thousands of acres about us free from these objections there is no necessity for a single dwelling being located on unhealthful ground. Rising land with good drainage, where the surface-water shall quickly pass off, where there shall be an abundance of moving air about the site, and an abundance of sunlight, is the most desirable.

CONVENIENCE

The location should be convenient of access not only for the occupants, but for all who may be in contact with them. Many a family have shut themselves out from society almost completely by building a home where friends can meet them only by making a very unusual effort.

The leading idea of modern times is centralization; and the advantages of being near neighbors where social intercourse can be frequent, where the whole family will be brought into close contact with the surrounding world, are many; but it becomes a question if the individuality, the strong characters brought out by the self-reliance acquired by living in more isolated sections, are not worth considering also. The electric railroad, penetrating far into the country, connecting town with town and country with town, the modern automobile now offered at a price not much above that of a good horse and carriage, will in a measure settle the question of the necessity for centralization and the depopulation of our rural districts.

Nearness to railroad, to school and church must be carefully considered; but as the cost of building lots remote from these conveniences is much less, those limited in means will continue to locate in the less favored sections.

The main street of the town or village has many advantages, but the cross or side streets have the advantages of greater quiet and allow of more freedom of action, besides being less expensive.

ELEVATION AND SLOPE

The height of the land above the sea-level and above the surrounding country should be considered. The higher the land the better and purer the air, the larger and more pleasing the landscape effect, and more perfect drainage may be obtained. There are, however, serious objections to extreme elevation and abrupt slopes which increase the effort needed to get to and from the place, and increase the cost of fitting the land and keeping lawn, walks, and drives in good condition. A southern or southeastern slope will afford much shelter where the prevailing winds during cold weather are from the north or northwest, and, if the landscape effect is equally good, should be selected in preference to a western or northwestern slope.

GOOD WATER

Nothing can make home life more miserable than an insufficient supply of water or water that is of poor quality, and the most careful investigation of this question should be made before deciding upon a location. If there are any conditions that may lead to the contamination of the drinking-water, they should have the most rigid investigation. With the modern methods of analysis it is possible to know positively the condition of the water, but analyses should be

made at two or three different times to determine if the supply is affected at one season of the year and not at another.

In villages and near old buildings most dangerous sources of contamination may be found in sink-drains, cesspools, stable-yards, etc., and if any of the above are found within from 200 to 300 feet, according to the soil, of a well the water should be regarded with suspicion.

These sources of contamination may not affect the water in a new well for many years, but sooner or later the surface-drainage will find its way down to the deep basins formed by our wells. The safest water-supply is that from a well-constructed and cared-for reservoir, brought in suitable pipes to the house. In these open reservoirs the water becomes purified by long exposure to the air, but does not possess the sparkle nor the coolness of water from a deep well.

KIND OF SOIL

While the location as to surroundings, elevation, water-supply, etc., are matters of first importance, the success and more or less the cost of the ornamental planting depends largely upon the nature of the soil. It will hardly be possible to find a soil perfectly adapted to the best growth of all kinds of trees, shrubs, and plants, yet any ordinarily good soil may be made to grow most of them without very great expense. The best soil for general purposes is a deep sandy loam, though a strong loam with a clay subsoil if thoroughly underdrained will often be satisfactory and, a thin soil, too, may be very much improved by deep working and heavy manuring, but in the latter two cases the expense of preparation and maintenance is very much increased.

Strongly Marked Natural Features, like Rocks and Water, Distant Views, etc.

These prominent natural features often found on building lots and surroundings should always be carefully considered, for they may be made to add wonderful beauty and variety if properly handled.



FIG. 2.—Arrangement of Rocks.

ROCKS

Large boulders and ledges should be preserved wherever possible, but the small boulders, loose rocks, and cobbles should all be put out of sight in well-kept grounds. The latter may be utilized as foundations for small buildings and for filling in the beds of walks and drives, or otherwise

disposed of where out of view. The practice of dumping them along the roadside, which we find in many country places, cannot be too severely condemned, for it renders the destruction of weeds and brush that come up among them



FIG. 3.—Arrangement of Rocks.



FIG. 4.—Unnatural or Inartistic Arrangement of Rocks.

almost an impossibility. If all the loose stones and cobbles could be removed from the borders of our roadways throughout the country, weeds and other objectionable growth could be easily kept down and the roadsides be soon covered with grass and desirable trees and shrubs as shown in Fig. 73.

Ledges and boulders serve as a nucleus around which to

group the ornamental trees, shrubs, and vines, and give an added naturalness and beauty that can be obtained in no other way. Large boulders may often be arranged in such a way as to give a steep embankment the appearance of a projecting ledge as in Fig. 2, and which shows them arranged upon both sides of a cut through which a drive or walk can be arranged with good effect. Fig. 3 illustrates boulders grouped on one side of a slope with very pleasing results. Fig. 4 shows a very unnatural and inartistic arrangement which would be greatly improved if trees, shrubs, and plants were planted around and among them. As much of the naturalness about these strong features as possible should be preserved. The trees, shrubs, and vines, the herbaceous plants and grass should be made to grow to greater perfection than in their wild condition, by careful attention and enrichment of the soil, and undesirable things should not be allowed to grow; thus will art and nature be combined and true beauty produced.

WATER

Close proximity to lakes, ponds, or streams may not always be desirable, but where there is open country about the place, with an abundance of sunshine and air, and the land is somewhat elevated above the water, few natural features can be made to produce so much beauty and pleasure. A vista of water, either moving or silent, through an opening in the shrubbery adds at once a quiet and a charm of which one seldom tires.

Moving water gives more variety, adds life and vivacity to the landscape, while the peaceful lakelet or pond has a quieting effect. In places where there is much of the bold and strong in the decoration the surprise and variety given by the quiet lakelet is very pleasing, while where the quiet, graceful features predominate a little moving, active water



FIG. 5.—Natural Water View.)

is equally valuable. In making confined sheets of water, if the source of supply is abundant, so that there is frequent renewal of the water within the basin, the outlet may be through an underground overflow as shown in Fig. 6.

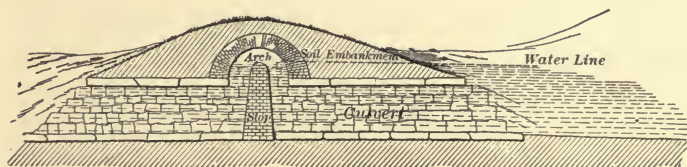


FIG. 6.—Underground Overflow of Lakelet.

If the supply of water is limited and not likely to be frequently renewed, the open overflow or outlet, as in Fig. 7, should be made, so that any foul substances that accumulate on the surface may be easily carried off. With the underground outlet it requires a tremendous volume of

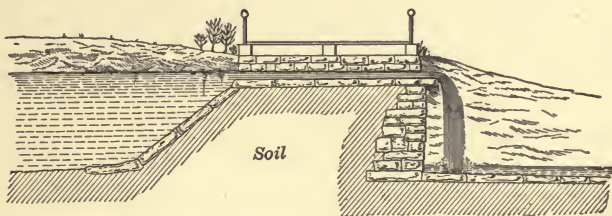


FIG. 7.—Open Overflow of Lakelet.

water to carry such light surface-material down into the culvert even one or two feet below the surface of the water.

The low murmur of the brooklet, or the dash of the cascade or waterfall, has charms for almost every one, and should be made a most prominent feature wherever available. Even if not on one's own grounds, by a little manipu-

lation of shrubbery water-views from a long distance may often be secured through open vistas.

The location of the home in the vicinity of stagnant water or where streams or ponds are likely to be contaminated by sewage or undesirable surface-drainage should be avoided unless there is some certainty that the surroundings can and will be improved.

Increase in Value

No thrifty person will think of locating in any place where, if by change of business or other circumstance he might be obliged to make a change in location, the property will not sell for something near its cost. In a great many localities, where near good railroads and thriving manufactories, property is almost sure to increase in value if a good selection is made and the home is economically built, while in others, more distant from business centers, real estate has gradually diminished in value, until we often find good home farms offered for sale for much less than the cost of the buildings upon them.

Amount of Land to Purchase

One of the greatest mistakes many people make when establishing a new home is in purchasing too much land, especially if they are persons of small means and little experience in caring for land. The amount that should be purchased ought to be limited to the actual needs of the purchaser. If means are abundant and extensive grounds and a large lawn with choice shrubbery are desired, or if more or less gardening is to be done, more land can be utilized, but even then the quantity should be limited to what can be *well* cared for.

The home garden is one of the greatest luxuries con-

nected with a comfortable home, provided one has the knowledge and skill to make the work a success and has the time to either do the work or to see that all the operations of planting, cultivation, and harvesting are properly done. To the professional man, the business man, or mechanic of sedentary habit the physical effort necessary to successfully care for a small garden of fruits and vegetables will be invaluable and one of the best means of securing vigorous health, while the products of a well-kept garden have often been made to supplement many a meagre income and provide the most healthful and appetizing food possible to obtain. (See Chap. XVI.)

But this caution should be observed: Do not undertake this work on a large scale until some skill or experience has been obtained. Small areas well tilled in all lines of agriculture and horticulture generally give the best results, and only so much land should be given to garden purpose as can be cared for in the most thorough manner. If land is abundant, a part of it might be set off to the children for a flower-garden, for the planting of a few trees or vines, or for growing a few vegetables like melons, etc. In no way can so much of nature and her ways be taught to children and a real love for all her products be fostered, as well as a strong love be developed for the home which they have helped to build.

Location of Buildings

After deciding where to build a home, the first question to decide is where to locate the house. Nothing can be more important. In building a house it is with the idea of permanent occupancy or for a long series of years, and any mistake made at this stage is often irreparable.

Wherever possible the house should be located at some distance from the street; the building will look better, and

more natural and beautiful decorations can be made than if it is almost on the street-line. In suburban districts where there are already many houses located, to place the building very much out of the line of those already built sometimes detracts from rather than enhances its beauty, but with an abundance of space between the houses they may be located at any distance from the street desired without detracting from their beauty. With an abundance of room between the house and street one is less troubled by

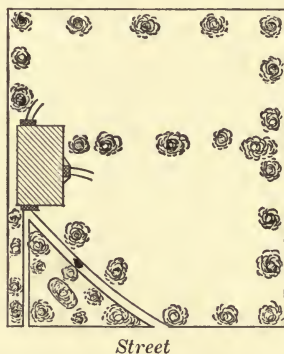


FIG. 8.—Buildings Arranged on One Side of Lot.

dust and noise, and better views of the building and grounds can be obtained from the street, and better opportunity is afforded for securing vistas of beauty and variety in looking from the house.

Where the lot is long and narrow and small in extent, say less than one-fourth of an acre, greater variety may be obtained by placing the house somewhat at one side, as in Fig. 8. This affords better opportunity for decoration, the use of larger trees and shrubs, and greater extent of lawn. In places of larger area a central location may be more

desirable, as the balance of the picture or better symmetry is more readily obtained.

Elevation of the House

No more frequent mistake is made by builders than in the elevation of the house. It is very difficult for an inexperienced person to judge how a house will look after the excavation has been made and the soil is brought up to a grade. The elevation should be such that there shall be perfect surface and sub-drainage, that all surface water shall pass off quickly. The elevation must also be sufficient to secure a perfectly dry cellar.

The view, too, must be considered, and it will be found that this is best when seen from a little above surrounding objects, and the beauty of the house and grounds is much increased if seen from a little below the level.

The cost of excavation and filling is a matter that must be considered, and if the soil taken from the cellar is not sufficient to do the grading it must be obtained from the nearest source of supply of good material.

Exposure of the House

Whether the house shall be on the north, south, east, or west slope is a matter of great importance in our changeable climate. On the southern, southeasterly, or southwesterly slopes a little under a hill or in the lea of a sheltering grove, the fierce northwest winds, so common throughout the country, are greatly modified, but some of our most lovely views are often lost under such conditions, and it becomes a matter of serious moment which of the two conditions to adopt. Shelter is very easily provided, however, in a short time by planting trees of rapid growth.

The location as related to the principal thoroughfare is a

matter that should receive attention. On the north side of a road leading east and west the front of the house will be open to the south, and the front rooms are thus exposed to the sun more fully than the rear rooms. If, however, more sunlight is desired in the rear rooms, a location on the south side of the street would be more satisfactory. Hallways and unoccupied rooms should be placed where there is the least sunlight.

But whatever the exposure, the aim should be to obtain shelter if possible from the prevailing winds, to secure as much sunlight as possible and preserve the most beautiful views.

Character of the Land

The beauty that may be developed in any place depends largely upon the character of the land. If without character, i.e., if perfectly flat and level, no marked or strong features can be obtained except at a greatly added cost. If, however, the land is uneven, with a valley here, a hill there, a ravine in one place or a mass of bold rocks in another, much more variety and much more beautiful views may be obtained. Whatever variety is obtained on a level building lot must be made by the contrast between the ornamental trees and shrubs and the architecture.

Architecture

In building a new house the architecture should be in keeping with the surroundings and within the means of the builder. The most unsatisfactory results are often shown where a large showy house is built in a quiet unpretentious place, or where the owner has put his last dollar into it and can do nothing toward decoration, but must leave the place in an unkempt and slovenly condition. Many a home is

built too large to be properly furnished or cared for, and thus becomes a source of anxiety and disappointment.

The simple, plain, well-built structure, with surroundings neatly planted and kept up in a neat and finished manner, has more attractiveness, is more enjoyed by the occupants, and adds much more to the appearance of thrift and comfort of a community than the large showy buildings without tasteful decoration and outside care.

While beautiful trees and shrubs may be grown and artistic arrangement of all of the material for home decoration be just as well made about a dwelling that has no features of beauty in itself, more satisfactory results may be obtained if the buildings harmonize with the natural surroundings.

If the buildings are already established, little can be done but adapt the decorations to their characteristics. Much greater beauty is added to the broad, low house by introducing some slender, spiry trees than by using all low-spreading trees, while with the Gothic or other light, high styles of architecture many of the graceful and low-spreading trees may be grouped with some of the spiry kinds. In every case there must be a blending of the materials used for decoration with the architecture.

Plans of the Home

PLANS OF DWELLING-HOUSES

So much is written at the present time on suburban architecture that no attempt will be made in this volume to give plans for such work. The reader is referred to the numerous works on the subject and to the many careful and well-elaborated plans to be found in our agricultural, horticultural, scientific, and literary papers which, with a

fair amount of taste in the decorative art and the assistance of a good builder, will enable one to decide understandingly what is needed and in many cases dispense with the expensive services of the professional architect.

In cases, however, of extensive buildings of considerable cost it will be found economical to have a full detailed plan made by an experienced architect. With a full understanding of all of the needs of the family which are to occupy the dwelling, the skilled architect will be able to obtain desired results and save many mistakes that the inexperienced would be likely to make, often saving the owner many times the cost of a working plan.

There is, however, a growing taste among our people for amateur architecture which should be encouraged, and many beautiful and well-arranged plans of all kinds of buildings have been produced by those about to build houses; and the pleasure experienced in building a house of one's own planning may more than counterbalance any saving in material or labor that might result from a plan made by a skilled architect.

COST OF THE HOUSE

It is the almost universal experience of those who build a house for the first time, especially those with limited means, that the cost largely exceeds the estimate, and this has led to the practice of adding 25 to 50 per cent to the estimate as it is ordinarily made. This deficiency may be accounted for generally by the fact that there are so many little things that go to make up the completed house that are overlooked or that are not incorporated in the builder's contract, and whenever a building is done by contract the most full and complete specifications should be made out. Where reliable, builders can be found who will look to the interest of the employer as well as their own, much more

satisfactory results may be obtained if the work is done by day labor than if by contract.

The requirements for a healthful house are, first,

GOOD DRAINAGE OF THE CELLAR

A wet or even over-moist cellar is often the cause of much sickness and discomfort, for it serves not only as a place for the development of disease-germs, but also those that cause the decay of the woodwork and hasten the corrosion of any metal substances stored therein. It causes contraction and expansion of doors, windows, casings, and floors, and gives no end of trouble in many ways. From its long use for storing vegetables, etc., we have come to think that a cellar is almost a necessity, but it is not so much so at the present time as when almost every family put in a large supply of provisions for winter use. Now the provision-dealer puts in large supplies and is ready to deliver fresh vegetables and fruit in limited quantities every week, or even every day if desired.

The cellar is useful in the modern house, however, not so much for storing winter supplies as for the location of the furnace and the needed fuel. In the "good old times" our houses were heated by burning large quantities of wood in the fireplaces; then came the stove, one in each room; and finally we have come to centralizing all heating apparatus in one furnace or boiler, which, until we come to the condition where all heat can be supplied to our dwellings from outside central stations, either by steam, hot water, or electricity, is by far the most satisfactory arrangement we find now available.

A well-drained cellar with a good furnace to dry out surplus moisture is a good place for storing fuel and other necessities, and is easily accessible for regulating the heat-supply.

In every case proper means should be provided for getting the coal and other fuel in and for taking out the accumulating ashes in such a way as not to necessitate crossing long distances of lawn with heavily loaded teams. The bulkhead or entrance into the cellar should therefore be located with this in view.

As far as possible all vegetables and fruit should be stored in the cellar of some outbuilding or in some frostproof vegetable or fruit room above ground, and except for the furnace and the fuel-supply a cellar is not a necessity in building the modern house.

Where perfect drainage can be obtained at little expense, under many conditions the cellar is desirable, and the space provided by its construction is much more cheaply obtained than in any other part of the building. Upon side-hills where basement rooms can be constructed, the space becomes still more valuable for kitchen, laundry, and other purposes.

The surface-drainage of all water from the roofs and all surrounding land should be first provided for by proper grading, so that it shall pass off quickly and without washing of the soil. The water from the roof should never be allowed to fall from the eaves to the ground near the foundations, but should be conducted in pipes and gutters as far away as is possible. Where the slope is very abrupt from the house, underground conduits should be provided to prevent surface-washing. Subdrainage should be provided along the inside of the cellar walls, and deep enough below the bottom to make it perfectly dry. If the soil outside is naturally wet or springy, a line of tile should be placed at such distance and depth as to make this satisfactory. With a cellar bottom thus drained outside and in, and carefully concreted with cement and sand, the most healthful condition possible will be provided.

PERFECT VENTILATION

This is a very large subject to even touch upon in a work of this character and limit, but is one of so much importance that no one who intends to build a home, however simple, should ignore it.

The first condition to be provided is a large space for taking in pure and forcing out the impure air in sufficient quantities for healthy respiration of the inmates. This is best provided by having open fireplaces in each of the principal rooms, or by means of separate flues for the inlet of fresh air and egress of the foul air, a draft being created in the flues by heat produced by a lamp, a gas-jet, a coil from steam- or hot-water pipes of the boiler, or from a separate stack heater.

Economy of fuel demands a close construction of the building by lining the walls with some non-conducting material like paper, building-felt, etc., and in very cold weather it is a matter requiring serious consideration how to heat the necessary amount of cold fresh air that we must have for health. The single thickness of window around which so much fresh air would enter we cover with storm-sash, our doors we make close with weather-strips, and the only source of fresh-air supply must be through the cold-air box that leads into the furnace or ventilating flues. If this is sufficiently large and properly regulated, and a quick draft is made by the flue being heated with a fire, gas-jet, or hand-lamp in the grate or open fireplace, or a coil or other heating appliance in a separate flue, pure air will be constantly supplied; but if the cold-air box is kept closed and no adequate escape is provided, the closely built house becomes a place for the generation of disease and ill health. The most approved method of arranging the heat-supply and foul-air escape is to have the former enter the room

near the ceiling and the latter to pass out *near the floor* in a separate flue on the same side, thus causing a full sweep and circulation of air in all parts of the room. If the heat enters on one side and passes out on the opposite side, the current of heated air may go directly across the room in a narrow current and the air at the sides of the room be imperfectly renewed.

HEATING THE HOUSE

Steam, hot water, and hot-air furnaces are all largely used for heating dwellings, and each has strong advocates among practical and scientific men, but which of them will give the best results depends upon so many conditions that no attempt will be made to decide the question here. With either steam or hot water enclosed in coils or radiators separate systems of ventilation should be provided by the open fireplace or the separate flue.

CONVENIENCE IN ARRANGEMENT OF ROOMS

In many homes the loved inmates are often in a few years forced to travel many unnecessary miles or suffer great inconvenience because of the poor arrangement of the important rooms of the house. The house should be adapted in every way to the conditions of the inmates. If the housework is to be done by members of the family, the kitchen and dining-room should be easily accessible to the sitting- or living-room, and every possible arrangement for comfort and ease of doing the work should be provided. If servants are to be employed, and such often becomes a necessity, with the modern condition of living, then the kitchen should be as remote from the sitting-room as is possible to avoid odors and noise, but both kitchen and sitting-room should be easily accessible to the dining-room

It is the practice of most of our people to build too high. The house with most of the rooms on the first floor has a hominess and brooding character that is especially adapted to country life, and much time and effort are often saved to the inmates by this style of building, though perhaps the cost of building a given number of rooms may be somewhat increased. In locations where the land is low and fogs and dampness are prevalent and where land is expensive the two- or even three-story building may be advisable.

An abundance of shelf- and closet-room should be considered as important as large rooms. Neatness, order, and economy of time are thus encouraged in all of the inmates by having a convenient place for everything and keeping everything in proper condition in its proper place. There should be an abundance of shed- and storage room in the outbuildings for the general comfort of all and for keeping up the necessary outside work of the home.

Sunlight in every room of the house is necessary for good health and should be provided for by the location and architecture of the house.

In the square-box house, though undoubtedly the cheapest to build, some of the rooms will receive but little sunlight. But by arranging the rooms in more or less of the cross form, or by the addition of wings, bay windows, etc., the fullest amount of sunlight can be obtained.

The recent improvements in styles of dwellings and the adoption of large or numerous windows are steps in the right direction. With the present low price of glass, and sash and doors made so cheaply as they are in our large factories, large windows and many of them to provide an abundance of light need not add materially to the first cost of a dwelling, and by the use of storm-windows during the winter little or no increase in cost of heating need be experienced.

PLUMBING

Every possible attention should be given to the plumbing and sanitary arrangements of the house and outbuildings; the limits of this book, however, will not allow of an extended discussion of the subject. The reader is referred to the many books written by practical men and women on this subject, such as "Home Sanitation," by Mrs. Ellen M. Richards and Marion Talbot; "Sanitary Drainage of Houses and Towns" and "Principles and Practice of House Drainage," and other works of Geo. E. Waring, Jr.; "Women Plumbers and Doctors," by Mrs. H. M. Plunkett, and many other works on the subject of house-drainage and plumbing should be carefully studied.

The work of plumbing requires much skill and patience, and only skilful and practical men should be employed to do this very important work. The "*plumber's bill*" is proverbial, and the complaint often made against their exorbitant charges are in some cases founded upon facts, but there probably are as many honest men in the plumbing business as in many other lines of work. To have a nice, thoroughly fitted job of plumbing done requires time and the best material, together with skill on the part of the workmen, all of which are expensive.

CHAPTER III

PREPARATION OF THE LAND

IN the preceding chapters the requirements of the house and other conditions have been discussed in a general way, and it now becomes necessary for us to take up in detail the preparation of the soil for the growth of the various kinds of trees, shrubs, and plants used for the outside ornamentation of the home.

Before any decoration of the grounds can be begun the house must have been finished and the débris removed from the land. It must be fully understood that upon few, if any, places can there be found all of the varieties of soils necessary for the growth of all of the ornamental material that it may be desirable to grow, and often it will be necessary to procure from outside sources such materials as are needed to improve it. In many cases, however, we find the soil well adapted, with slight additions, to the growth of all the kinds of trees, shrubs, and plants that it is desirable to grow, in which case the cost of preparation is much reduced.

Preliminary Grading

When the excavation is made for the cellar, the surface-soil should be scraped to one side and the subsoil to another, that the former may be used to make the surface-covering over any places that may have been deeply filled in with poor material. Whenever fills are to be made of considerable depth, as the foundation of the drives and walks,

basins and valleys, the surface-soil, if it is needed or can be utilized, should be first shovelled or scraped to one side and then be graded over such coarse material as may be used for this filling.

The surface should slope away in all directions from the house, so that there shall be no surface-water standing at any time during the year within several yards of it, and in *no place* on the lawn should there be basins where the water shall stand for any length of time after heavy showers, or during heavy rains or melting snows in the winter and spring. In the latter case, especially if ice is formed upon the lawn, the grass will often be smothered (winter-killed) or drowned out, so that much labor will be required to reseed and bring it into good condition again. Thorough and deep underdraining will in a measure overcome this difficulty, but when the ground is frozen water will stand on the surface, the grass will be killed out, and a growth of wild grasses and weeds often come in that it is almost impossible to eradicate.

The preliminary grading should be done as soon after the completion of the house as possible, that the land may become perfectly settled before sowing the grass-seed or setting the trees and shrubs.

Obtaining the Grade

To obtain the desired smooth grade, flowing outline, and curve of surface, where the services of the skilled civil engineer is not available, various expedients are resorted to. Many persons with a quick eye, trained to detect unevenness of surface or irregularity and unsymmetry of form, can obtain very good results without the aid of any instruments, but the majority will be obliged to call to their aid at least the carpenter's or mason's level and more or less small stakes. With this instrument resting on a box or

block with a broad base, one may obtain the levels at important points on the ground, and then by stretching strings from stake to stake, as shown in Figs. 9 and 10, easily judge of the comparative height of each point, and make up the

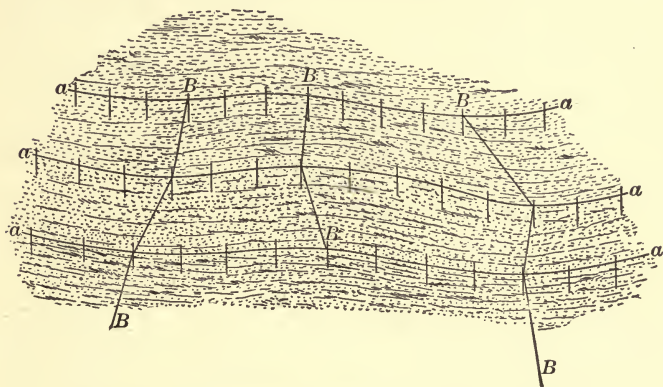


FIG. 9.—Illustrating Methods of Obtaining Grade.

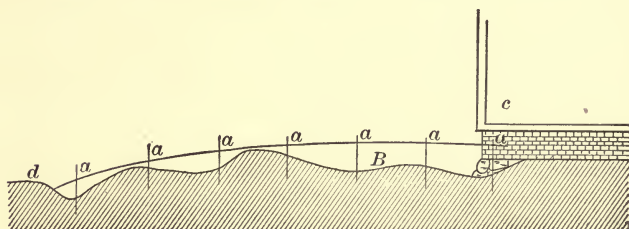


FIG. 10.—Illustrating Methods of Obtaining Grade.

grade-lines and mark on the stake the necessary depth of fill or excavation to be made at each stake. In all this work the different grade-lines must be made to blend together so as to form a pleasing whole.

Where the land is rough and more or less covered with

stones and stumps or the roots of large growing trees, much hand labor must be resorted to, spading and digging up the soil about the rocks, filling in with good soil where the surface-soil is poor and shallow, and rounding and smoothing up to the required grade. If the roots of living trees

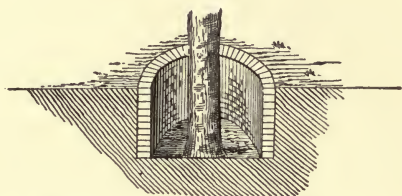


FIG. 11.—A "Well" about Tree with Roots Deeply Covered.

are near the surface, deep working must be avoided, but where feasible a covering of six to eight inches of good soil over these roots will often prove the cheapest way of making a good surface for the lawn. Deeper covering than this must be avoided, as it often results in the death of the

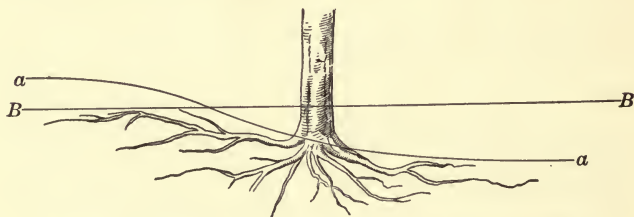


FIG. 12.—Illustrates Covering the Roots on Only One Side.

trees. If it becomes necessary to cover deeper than the above, a "well" should be made about the trunk, as in Fig. 11, until the roots have had time to work to the surface. This well may be from 4 to 8 feet in diameter, according to the size of the tree and depth of covering. After

two or three seasons of growth, when the roots have worked through the soil to the surface, this space may be filled in with safety.

If the covering of soil is over only a part of the roots of the tree, as in Fig. 12, the roots coming to the surface on one side, little injury need be feared unless there is a great depth of soil about the trunk, in which case the "well" should be made.

It is very difficult to make grass grow to great perfection under the shade of trees and where the tree-roots fill the ground, and the main dependence must be on surface-dressing with rich soil or compost and frequent seeding.

The Lawn

Upon no one thing does so much depend in making beautiful home grounds as upon a good lawn, and after the buildings and the preliminary grading are completed come the smoothing up and preparation of the soil for the grass carpet or "*groundwork*" of the home-picture, without which no picture, whether on canvas or made of living plant-growths, is complete.

A good lawn cannot be made except on a rich soil, and if this is not the natural character of the land in hand the first thing to do is to make it rich and as deep as possible.

MANURING THE LAWN

Where the land is free from stumps, stones, or other obstructions, a liberal dressing—from 10 to 15 cords per acre—of rich compost should be ploughed under as deep as possible. If the land is full of tree-roots and large rocks, this material must be spaded in or worked into the surface in some way. In addition to the above application 2 or 3 cords of well-decomposed fine compost, or from $\frac{1}{2}$ to 1 ton

per acre of any of the standard lawn fertilizers should be thoroughly worked in upon the surface. While commercial fertilizers alone often give good results, the effect of a heavy coating of stable manure is such as to make the land less subject to drouth. Fertilizers containing substances like nitrate of soda, muriate of potash, etc., should be used with caution, as they often injure the young grass plants. More failures in lawn-making come from a scanty supply of plant-food in the soil than from any other reason, and the poorer the soil the more liberal must be the supply of plant-food used.



FIG. 13.—Improper Grading about Dwelling.

MAKING THE SURFACE

After the fertilizing-materials have been applied the land should be thoroughly worked and smoothed until a perfect seed-bed is obtained.

In grading away from buildings a perfect level should be avoided. Fig. 13 illustrates a very unnatural and unsatisfactory grade, for the reason that the surface-water will not readily pass away, while the rounded surface that might be as well produced is much more natural and beautiful. If graded to a curved line running from the base of the build-

ing in this figure to the outer edge of the lot, much more pleasing results would be obtained.

The perfectly flat surface is scarcely ever found in nature except on the surface of water or boggy lowlands, and is very



FIG. 14.—Well-graded Lawn.

difficult to ornament. The terrace also in the middle of Fig. 13 is an unnatural feature, and hard to keep in perfect condition. In Fig. 14 is shown a well-graded surface with flowing outline. The effect of a level or flat surface is to give the impression of limited extent, while the rounded

surface, as shown in Figs. 15 and 16, gives the impression of greater extent. The last figure illustrates a steeper grade

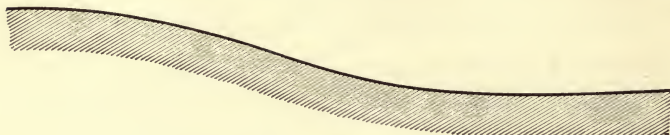


FIG. 15.—Grading to Curved Surface.

than is shown by Fig. 13, but even with the same grade or slope a much more pleasing effect is produced and the ground



FIG. 16.—Grading to Curved Surface.

made much more susceptible to beautiful decoration.

Figs. 16 and 17 still further illustrate the receding and



FIG. 17.—Grading to Curved Surface.

rounded outlines desirable even if the grade be very great. In Fig. 17 greater variety of surface is produced, affording the appearance of much greater extent.

SETTLING THE SOIL

To obtain a perfectly even, smooth surface, the land should be raked, then rolled, the depressions made by the roller filled up, then raked again, and this work repeated until a satisfactory surface and a good seed-bed are obtained.

All trees and shrubs should, if possible, be planted before the grass-seed is sown. If planting cannot be done at this time, it should be delayed until the grass has become well established; otherwise the lawn will be very much cut up in the process of planting.

LAWN GRASSES

Only those grasses that make a fine spreading growth, i.e., tiller or spread by underground stems, give good results in lawn-making. The best kinds for general purposes are the bent grasses or redtop (*Agrostis alba*, *A. vulgaris*, and *A. stolonifera*) and June-grass or Kentucky blue-grass (*Poa pratensis*), all of which spread rapidly by underground stems, that quickly fill up any vacant spaces between the grass-plants and thus prevent the growth of weeds. They also succeed on a greater variety of soils than almost any other varieties. On very light land and under shade of trees there might be added to the above the wire-grass (*Poa compressa*) and sheep's fescue-grass (*Festuca ovina*) and its varieties, although the latter grows somewhat in tufts. White clover (*Trifolium repens*) is generally used in making a lawn, as it grows close to the ground and fills up all spaces not occupied by the grassroots, thus preventing the growth of weeds. None of the coarser grasses, like timothy (*Phleum pratense*), orchard-grass (*Dactylis glomerata*), tall fescue (*Festuca elatior*), and rye-grass (*Lolium perenne*), have been found satisfactory by the author except where immediate effect is of more importance than a permanent and fine lawn.

TIME FOR SEEDING

While the spring is the best time in which to seed a new lawn, it may be done at any time if the proper conditions of moisture can be obtained. A very large amount of manure or fertilizer and a moist condition of the soil will enable one to seed a lawn successfully at almost any time of the year, but these conditions are not so certainly secured at any other time as in the spring. In fall seeding, unless done very early, the young plantlets are likely to be thrown out by the frosts and a second seeding be required in the spring. Another reason why spring is better than summer for seeding is that weed-seeds do not grow so readily and abundantly at this time. Coarse stable manure should never be used upon the surface of the land, because as it is usually unfermented, it contains much live weed seed which will immediately start into growth; but, if turned deeply under, nothing can be better to hold the moisture in the soil and encourage deep rooting of the grasses.

QUANTITY OF SEED REQUIRED

The amount of seed to be used will depend somewhat upon the season when sown and the probable amount of weed-seeds in the soil that will germinate with the grass-seed. When sown in April, May, or September, less seed should be used than if sown in June, July, or August, and more seed will be needed when the land is full of weed-seeds than when it is comparatively free from such pests.

It is always best to use an abundance of seed, as there may be some uncertainty of its all germinating. Perhaps the quantity per acre that will give the best results under the average conditions is 2 bu. of bent-grass, i.e., red-top or its varieties, 2 bu. of June-grass, and 10 lbs. of white

clover. One-half of this quantity would be sufficient if it all was certain to germinate and if no weed-seeds started into growth.

SOWING THE SEED

After the land has been made perfectly smooth and fine by raking, rolling, and reraking the seed should be divided into two or more lots. The first lot is then sown in strips or lands, as evenly over the surface as is possible, and then raked in, taking care not to move the soil from place to place, thus bunching up the grass-seed with it. The second lot of seed is then sown in strips crossing the land at right angles to the first sowing, thus securing the most even distribution of the seed possible.

A rake with long teeth set about 2 inches apart is better than the common iron-toothed garden-rake. If nothing better can be obtained, the common wooden hay-rake will be found to work well.

It is the general practice to roll the ground with the garden-roller after the seed is sown, but in extremely hot and dry weather, while the soil may be more thoroughly firmed about the seed by rolling, the smooth rolled surface leaves the young seedling so much exposed to the action of burning sun and drying winds that if a good seed bed has been made grass often does better if the surface is not rolled at all.

BORDERING WALKS AND DRIVES WITH TURF

Before the seed is sown, if the edges of walks and drives, flower beds, etc., are bordered with strips of fine turf on each side, much after labor will be saved, for it is very difficult to trim up the edges of a newly seeded lawn without destroying much of the grass; and until the walk is completed and well settled there is more or less danger that the outline will

be changed or edges defaced by passage over them. Water is necessary to make a perfect lawn on thin soil, but watering a newly seeded lawn, unless the water is applied in a very fine mist, will do harm rather than good, as the surface is so compacted that evaporation is greatly increased. When watering an established lawn the water should be applied with a very fine nozzle and enough applied to wet down to the lower grass roots. If only an inch or two of the surface is wet the grass roots will grow toward the surface and be more injured if dry weather continues.

LAWN MADE OF TURF

Where fine, close turf composed of desirable grasses can be obtained, if the area is not very extensive, this is the best way to establish a good lawn. It has the advantage that it may be done with perfect success during the hottest weather, or at any time when the ground can be worked. The land should be as carefully levelled up and settled as for seeding and be made equally rich if the best results are desired, though a turf may be formed in this way on very poor soil, but it will soon run out under such conditions. In laying the turf it should be very firmly pounded down and settled into the soft soil under it; otherwise it soon dries up in times of drouth. If turf is not abundant, it may be laid in strips one or two feet apart and the intervening space be seeded, when the roots from these strips will spread and a compact turf soon be formed over the whole ground. Turf will grow better if it is laid so that after settling it is $\frac{1}{4}$ of an inch below the grade, as water is better held and fine soil will soon fill the surface up to the grade.

Great care must be exercised on a newly seeded lawn that it is not cut up or disfigured by walking over it or allowing teams or animals on its surface. The lawn-mower should

not be allowed upon it until the turf has become sufficiently firm to prevent the wheels from cutting in while turning the corners. The first two or three cuttings should be done with the hand-scythe or grass-hook. (Note turf on lawn in Fig. 14, p. 35.)

CLIPPING THE LAWN

Frequent clipping of the lawn, especially during the cool weather of spring and early fall, is necessary to make a fine close turf and allowing all of the clippings to fall on the ground to decay is the "perfection of cultivation." The lawn-mower should be run at least once each week, and in case of very warm moist weather it may be necessary to run it twice or more. If the grass becomes so tall and heavy that the clippings do not settle down at once among the growing blades, it should be caught in the basket attached to the mower or be raked up and carried away; for if a heavy growth is allowed to lie on the ground the roots of the grasses, are often destroyed during hot moist weather, and weeds will be prompt to start in their place. Clipping should be frequent enough that it may settle down among the grass plants. The modern improvements in lawn-mowers leave but little to be desired in the line of perfection, but which of the many machines is the best is a question I shall not attempt to settle here. The horse mower is a great-labor-saving machine where large areas are to be cut, though it is not always possible to do as good work as is done by the hand-mowers, and the tracks made by the horse, unless lawns shoes are worn, seriously disfigure a soft or newly made lawn. To enable the mower to run up close to shrubbery and borders to cut the grass so that no hand-clipping need be done, we have practised taking out a circle of turf about one foot from the trunk of trees or the edge of a clump of shrubs and

borders. This enables the machine to take all of the grass clean and leaves nothing for the grass-hook to cut. (See Specimen Lilac.) (Fig. 134, p. 238).

DRESSING AND RENEWING THE LAWN

Frequent dressings of fine compost or special fertilizers in the fall or spring are necessary to keep any lawn in good condition, and especially if on poor soil or under the shade of large trees, whose roots take up the plant-food in the soil with great rapidity.

Covering the lawn with coarse manure in the fall, to lie more or less exposed to view, is very objectionable and unnecessary, as a fine compost is equally effective in producing good growth and gives off no offensive odors. Quickly soluble fertilizer, like nitrate of soda, sulphate of ammonia, muriate or sulphate of potash, and acid phosphate may be used in limited quantities—from 100 to 200 lbs. per acre *on an established lawn*; but on a new one these salts cannot be safely used unless thoroughly mixed with the soil some time before seeding. Fine-ground bone, fine fish, cotton-seed meal and basic slag in place of the nitrates may be safely used under any conditions with no fear of injury to the roots or leaves of the young grasses. In place of acid phosphate, basic slag may be used 400 to 800 lbs. per acre.

Special lawn-fertilizers, manufactured by nearly all of the large fertilizer-dealers, are composed of materials well suited to make a rapid growth of lawn-grasses, but the same elements used in their unmixed condition will cost very much less and give equally good results.

The quickly soluble fertilizing-materials, i.e., salts of ammonia, soda, and potash, should be sown just as growth is beginning in the spring, while the less soluble, i.e., bone, fish, cotton-seed, basic slag, etc., may be sown in the fall or during the winter.

RESEEDING THE LAWN

Fertilizing-materials alone will not keep the lawn in perfect condition, but grass-seed should be frequently sown and raked in *with the compost or fertilizers*. Perhaps the best time to sow this seed is in August, nature's natural seeding-time, and in the early spring just as the frost is working out of the ground.

The quantity to be used may vary from one to two bushels of seed per acre, scattering it most freely where the soil is the poorest or where weeds are most likely to come into the lawn. If a heavy roller is run over the established lawn surface after the seed and fertilizers have been sown, the seed will germinate more quickly and there cannot be any injury from its use as there would be on land newly seeded.

CHAPTER IV

TREES—THEIR PLANTING AND CARE

THE lawn may be considered the canvas upon which the home-picture is to be made, and trees and shrubs, together with the buildings, make up the most important materials to be used in the work, and no comfortable or beautiful home can be made without them. No country can boast of so many beautiful trees and shrubs as the United States, and, with the addition of the choicest species and varieties from many countries now offered by our nurserymen, we have the greatest wealth of material for the most elaborate work of home decoration.

In Chapter X will be found a brief description of the most desirable trees and shrubs for growth in the United States, giving special conditions required for perfect growth of each kind, to which the reader is referred.

Shade Needed about the Home

Some shade about the house is an absolute necessity for comfort during the hot days of our summer months, and much shelter may be afforded by them during our bleak and stormy winters. But, more than this, they are necessary in many places to *cover up* unsightly or unpleasant objects, without covering up desirable views, to *form backgrounds* for other ornamental materials, and also for their own individual beauty and the variety they afford in their varying shades of color and form. What beautiful shades and tints of color may be found in the foliage of different trees and in the same trees at different seasons of the year,

and when skilfully arranged and blended together what beautiful pictures may be made with them!

Some of our trees produce beautiful flowers, others beautifully colored leaves; some take the spiry form, and others grow with well-rounded outline; some grow with a spreading or graceful habit, while others are close and massive in their build; some have thick and compact foliage, while others are provided with light and airy leaves;—and the true lover of nature will find much pleasure in the study of the numberless forms and varieties, and especially in arranging them so as to obtain the most real beauty possible.

A Plan

Before any planting is done a plan of arrangement must be decided upon. As with plans for dwellings, much good work can be and is done by amateurs in making plans for ornamental planting, but unless one has made considerable study of the materials to be used and the results to be obtained by their combination, and has investigated all of the points as to the special requirements of soil, planting, training, etc., of each species or variety, the advice of an expert should be sought.

While in making plans for the arrangement of ornamental trees, shrubs, etc., the money paid to a skilled landscape-gardener for a detailed plan often saves many times this amount, I would not discourage the study of the landscape art by advising every one to have a plan made by a trained landscape engineer; for the more general the knowledge among our people there can be upon any subject the better it will be for the whole community, while the *monopoly* of any line of education or knowledge by the few is a crime and an injury to the people as a whole; and many an amateur has been able to produce results that have not been reached by members of the profession.

Dwelling under a Large Tree

The details of the plan of arrangement and what trees and how many to use must be largely settled by the requirements of the place to be decorated and the conditions and tastes of the owner. On grounds of considerable extent



FIG. 18.—Dwelling under a Large Oak.

with an abundance of space large broad spreading trees in considerable variety can be used, while in the village lot few, if any, large trees are desirable. Yet under some conditions a single large tree not far from the dwelling, even on a small lot, may be productive of much comfort and pleasure, and, while very little variety may be obtained, the effect is often one of real beauty.

Improving Established Trees

In Chapter VII brief reference is made to the treatment of trees already on the grounds. These, if large, should be very carefully considered, and not a single healthy

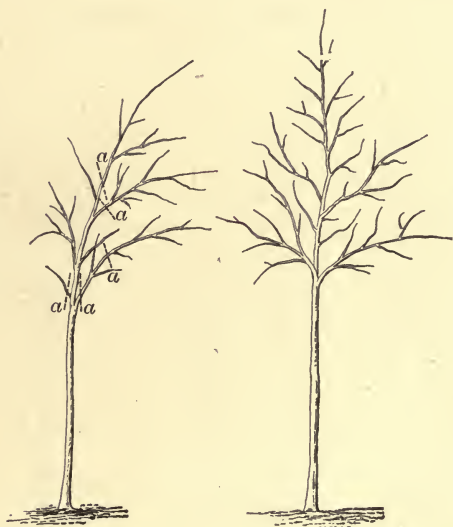


FIG. 19.

FIG. 20.

FIGS. 19, 20.—Trees as Often Found by the Roadside.

tree be destroyed unless for a positively good reason; for the most quickly growing trees that we have will not reach the size to afford much shade until they are fifteen to twenty years of age, and if what we have already growing are not quite what we wish we may preserve them until such a time as other and more desirable trees have grown up to take their place. Fig. 20 shows a perfect young tree.

The condition of those trees often found growing by the

roadside, especially where they have grown closely together, is generally such that severe trimming and some training may be necessary to bring them up to the most beautiful and perfect condition; but trees with sound trunks and good roots in good soil even though large and ill-shaped may be made ornamental. Figs. 19, 22, and 23 illustrate trees as they are often found, growing by the road-



FIG. 21.

FIG. 22.

FIG. 23.

FIGS. 21-23.—Trees as Often Found on Building-lots.

side or pastures, and the dotted lines *a* show where they should be cut or headed back to give them the proper start to renew their growth. Fig. 21 shows a very tall tree with branches and leaves so far from the ground that when the foliage is covered with moisture or the shoots with ice or snow it may be injured by bending to the ground; when if cut as shown at *a* to the height desired and a leader encouraged to form the centre of the growth, with laterals at

intervals of from six to ten inches apart, as perfect a tree will be formed as if grown from seed in full exposure or obtained from the nursery (see Fig. 20). When cut off in this way, the branches should not be allowed to grow in a cluster at the top, as in Fig. 25, thus forming a fork which is sure, sooner or later, to break down from weight of foliage, crowding of branches, or ice and snow. Many trees grow up



FIG. 24.



FIG. 25.



FIG. 26.

FIG. 24.—Trees as Often Found on Building-lots.

FIG. 25.—Clustered Growth of Branches.

FIG. 26.—Lines for the Proper Trimming of Fig. 25.

with forked branches not very far from the ground, as shown in Figs. 22 and 23, which when they reach large size will split down and thus ruin the whole tree. In this case the smaller of the two forked branches should be cut away at line *a*, the head be cut back if needed, and a perfectly formed tree will be the result. This fork is sometimes near the ground and (Fig. 22) the sooner one of the trunks (Fig. 23) is cut

away the better. In Fig. 19 is shown a one-sided tree, which may be put into condition to make a good form by cutting off the branches at the lines *a*, when with full exposure to air and sunlight it will take an upright symmetrical growth.

Pruning Old Trees

Fig. 27 illustrates an old tree which has been severely pruned. Before pruning, long straggling branches were



FIG. 27.—An Old Tree Headed Back.

exposed to the hot sun and drying winds and the sap so retarded that very little new growth could be made. If these branches be headed back as shown in the figure, a new growth will soon be sent out, the trunk and branches soon be clothed and protected, and the form much improved. The best instance of the success of this kind of pruning to which I can call the reader's attention may be seen at the

Arnold Arboretum at Jamaica Plains, Mass., where under the skilful management of Prof. C. S. Sargent and Jackson Dawson, the large, more or less unsymmetrical forest trees upon the grounds when the planting of other trees began have become most beautiful and symmetrical trees.

Covering Wounds

Whenever large branches are cut off or wounds are made upon the trunk or branches, the injured part should be thickly covered over with asphaltum or linseed-oil paint. This will prevent very rapid decay of the wood, and when grown over the injured parts will remain comparatively sound for many years.

Selection of Varieties

In the selection of varieties the inexperienced especially must give the matter very careful consideration. Dependence cannot be placed on the often exaggerated descriptions found in the average nurseryman's catalogue. Especially is this true of new varieties, for *no one* can tell just how they will do under differing conditions and what insects or diseases may be found to destroy them as they grow toward maturity; and nothing should be planted, in the main features of the place at least, which has not been fully tested under many varying conditions. New and untried things should, if planted at all, be put where they may be replaced, should they fail, without injury to the main features of the grounds.

With the large numbers of parks, arboretums, and extensive planting on large estates, and especially the experiment-stations in all of our States, any one can learn what are desirable trees and shrubs for any given locality, and there

is no need for taking any risk in planting ornamental grounds with untried varieties.

In selecting the varieties best adapted to one's own locality a few visits to some of the above-mentioned places, a careful inspection of such as may be found growing in the vicinity, and a study of their adaptability to the various kinds of soil will enable one to make a satisfactory selection.

Size of Trees

The size to which different kinds of trees will grow must be fully understood, although this will vary very much with the condition of the soil in which they are planted.

While young they occupy but little space, and the desire to have enough planted to give immediate effect often leads to too close planting. The larger the space to be decorated the more and larger trees may be used and the greater variety obtained.

The reader is again urged to study carefully the descriptions in Chapter X.

Distance for Planting

Specimen trees should never be planted so closely that they will touch, even when fully grown; but if grouped for the formation of a grove, for dense shade, close planting is advisable, and the more closely planted the taller will they grow and the fewer will be the lower branches.

While of small size it may be well to plant closely for immediate effect, removing the least desirable specimens *before they touch so as to injure* the more valuable.

For avenues, for shade of walks and drives, the distance should be such as to give full development and yet produce the desired shade.

If the walk or roadway-space is narrow, the distance lengthwise may be much greater than across the space, as in Fig. 28. For the large-growing trees, like the elm and oak, and in deep, strong soil, 50 feet is about the best distance for roadside shade, and for the maples, poplars, tulip-tree, etc., not less than 30 to 40 feet. If shade is desired more quickly than can be obtained by full growth, the trees may be set out at half the above distances, and then when they come together so as to endanger the beauty of all every other one may be cut out. The great danger of this practice, however, is that we are liable to neglect the desired thinning out until too late. If this close planting is practised, it

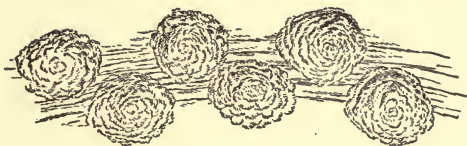


FIG. 28.—Arrangement of Trees on Narrow Streets, Drives, or Walks.

must be borne in mind that two or more trees planted on a given space will require more plant-food and more care than one, but, on the other hand, in very exposed places one may serve more or less as a shelter for the others, and thus a better growth be obtained than if but one were planted.

Where to Obtain Trees

With the large number of good nurseries in the country no one need find any difficulty in obtaining good trees for planting. Other things being equal, the nearer home the trees are obtained the better, as there is a great deal of risk to run in buying trees from distant nurseries on account of the danger from injury by delay in transportation.

If one is skilled in caring for trees in the nursery, small

seedlings or grafted trees may be obtained a few years before they are needed, and when ready for planting they will be in the most perfect condition for successful growth, as they may be dug one at a time and be planted with the least possible exposure of the roots to the air. The work of planting also can then be done at the proper time.

Much pleasure may be derived from this work in watching the growth of the young trees started from seed or very young grafted stock, and in training them into proper forms. Good specimens of the elm, maple, and other deciduous trees, and some of the evergreens, may often be dug from pastures and roadsides with success and if properly treated will make a satisfactory growth. The oaks, hickories, and others having a long tap-root and but a few fibres need to be dug around one or two seasons before transplanting, cutting a trench 2 feet deep and a foot wide and filling it in with good soil. This will cause fine roots to grow and then the trees can be more successfully transplanted.

Time for Planting

In light land not too much exposed to drying winds and in climates where the growth of the trees matures early the fall is the best time to transplant most of our deciduous trees, but in places much exposed to sweeping winds or in heavy soils much injury is often done to fall-set trees by this exposure.

Except under the above favorable conditions spring is by far the most favorable season for transplanting. This should be done as early as possible, but not until the soil will work up fine and mellow.

If possible, the trees should be on the ground ready for transplanting at the earliest possible moment, and if ordered from distant nurseries the order should be sent in in time for prompt and early shipment. If the orders are sent

during the rush of shipment, there are many chances for delays, and more injury will result from delay at this time than if shipped early in the season. If purchased in the fall and carefully heeled in in rather light, well-drained soil, a considerable part of the trunk covered with soil, and the tops protected by pine boughs or some other light airy covering, they will keep in perfect condition and be ready for planting at the earliest possible moment in the spring.

Evergreens may be transplanted with success at any time of the year from April to December, when the ground will work up fine and mellow, *if the weather is wet and soil moist*; but in July and August there is often danger from drouth, and in November the ground often freezes up before the soil has become fully settled about the roots, therefore these months are not so desirable for transplanting as April, May and June. For transplanting evergreens a moist day, just after an abundant rain, gives the most perfect conditions. Perhaps the most favorable conditions for transplanting evergreens will be found in the months of May and June.

Preparation of the Soil

Without a good soil properly prepared no one should expect to make newly transplanted trees grow satisfactorily. If the land is smooth and free from rocks, the subsoiling and manuring done when fitting the land for the lawn will be sufficient for a good growth of the trees, but if it has not been worked in this way special preparation must be given the soil for the roots of each tree. In a naturally rich soil, if the subsoil is worked up and partly replaced by the surface-soil, and good enriched soil be worked in around the roots, a vigorous growth may be expected; but if the soil be poor, some fine compost must be put in around them.

Unfermented manures in large quantities, or fertilizers containing the salts of potash or soda, should *never be placed in contact with the roots*, but, if used at all, should be spread on and worked into the surface-soil.

The space to be prepared for the roots of each tree should be considerably larger than the spread of the roots, varying the size according to the soil; the poorer the soil the larger should be the space that is broken up. Where large holes are needed in hard rocky soil, dynamite may be used with success in making them.

Digging Trees for Transplanting

More trees die from injury received in digging than from any other cause, and the greatest care must be exercised in this work, as so much of the success in transplanting depends upon how well the work is done. Without a good root system, no matter how favorable the other conditions are, there can be but little growth.

In digging the trees the first thing to be done is to remove the surface-soil down to the roots and then to cut a trench around the tree at a distance of from 1 to 4 feet, according to its size. With young trees, or those that have been transplanted once or more, cutting down with a sharp spade in a circle around the trunk will be all that is necessary, when, with the aid of a strong spade on each side and a strong man to pull, the tree may be loosened from the soil with a good supply of roots. If the trees be large, the soil must be removed from the trench to the depth of the lowest roots, which will be from one to two feet, and the roots be then loosened under the ball and freed from the soil, until the ball can be lifted from the hole or raised upon planks to be mounted on a stone-boat or low truck for moving it to the place of transplanting.

Sometimes this moving can be done best in the winter, the trench about the tree being dug in the fall and the ball allowed to freeze, when it can be more easily handled. But if proper care is exercised no difficulty need be experienced in moving large trees either in the fall or spring. Trees with trunks a foot or more in diameter may be moved if an excavation is made under the root system and a large ball of earth is taken up with the roots. To move such trees requires great expense, and appliances of screws and lifting-apparatus for raising and moving many tons of soil.

Pruning Trees for Transplanting

No matter how carefully a tree may be dug, many of the roots will be injured, and with trees that have been dug several weeks, as they often are when purchased from a considerable distance, nearly all of the feeding-roots are destroyed, and can supply but a small amount of sap to replace the moisture that evaporates from the large number of branches and buds, so that growth starts very slowly or the trees fail entirely. By removing some of the branches and buds in proportion to the injury of the roots a balance is created. Considerable heading in of the top should be done even if there are but few roots injured and only a small surface of branches and buds to be supplied with sap, for there will be a much better chance of the remaining buds starting, and these will grow with greater vigor than if no pruning were done. (See Fig. 24.) After a few strong active leaves have been grown vigorous new cells will be formed rapidly, instead of the weak sickly growth of the unpruned tree. Figs. 24 and 26 illustrate small trees properly pruned for planting, the dotted lines showing where the cuts should be made.

The Proper Height of Branches

Pruning too at the time of transplanting is often necessary in order to start the branches at the desired height. If low-branching trees are desired, it is often necessary to head them in severely from the top, as in Fig. 21. This is especially the case with trees taken from swamps, pastures, and roadsides. If all the branches are cut off to a "bean-pole" condition, as is often done with very tall and top-heavy trees, much care must be exercised that the branches do not all come out nearly at one point, as in Fig. 25. A leader should always be started, as shown in Figs. 20 and 26; and the laterals must grow slowly and at considerable distance apart to prevent the formation of forks that will split down when the trees are heavily loaded with snow or ice. The height at which the main branches shall be started depends upon the surrounding conditions. For covering avenues or walks a height that will clear the heads of pedestrians when the branches are weighted with rain or snow is sufficient; and for a drive a height that will clear any carriage or loaded team that may be driven under them is sufficiently high, unless it is desirable to get views or vistas under the branches through to pleasing objects.

With trees from the nursery less pruning is needed than if taken from the woods or roadside, as their root system is generally more compact, owing to transplanting and cultivation; but it will be better to prune as much as is necessary to start the tree in proper shape, cutting out all shoots not in proper position to form a satisfactory head, and shortening in all of the permanent shoots, always preserving and encouraging a leader whether the tree be naturally a round or conical-formed one; but this applies more especially to all avenue trees, which should be kept growing most vigorously

at the centre or top. In Figs. 24 and 26 the dotted lines illustrate where the cuts should be made.

Pruning the Roots

All ends of roots that are broken or injured in digging should be pared with a sharp knife to facilitate the formation of new roots, and when large branches are cut off the wounds should be painted over with some waterproof covering, like shellac, grafting-wax, asphaltum or linseed-oil paint, to prevent decay.

Evergreen trees are not generally pruned much at transplanting, but they will be benefited by some shortening in of the end branches, cutting out all but one leader, and removing any branches that are not needed to produce a symmetrical form.

Planting the Tree

No matter how well the soil may be prepared, how fresh the trees may be when received, or how well they may have been prepared for planting, if the work of planting is not properly done, they may fail to grow at all or grow so poorly as to give little satisfaction.

Many failures in tree-planting result from the slovenly and imperfect way in which the work is done, and the nurserymen are too often blamed for the failures.

In planting, the roots of all trees should have a fine mellow bed of good soil, which should be pressed firmly into contact with every fibre, leaving no air-spaces around any of them, and every one should be spread out in a natural position and so that no two shall touch each other. Immediately in contact with these roots good soil should be very firmly pressed with the foot or a tamper, so that new roots will be encouraged to start out at the earliest possible moment.

The late Peter Henderson, than whom there have been few, if any, more successful growers of all kinds of plants and trees, tells a story in one of his catalogues illustrating the benefit from the firm pressure of the soil about the roots. "A lady to whom he had sold some rose bushes wrote to him about the condition of her plants after she had spent much time in planting and caring for them, stating that only one out of a dozen had lived, and that one her husband, who weighed 240 lbs., had accidentally stepped upon soon after planting." It is also sometimes said that the "*heaviest* man or the one with the largest feet is the best man to plant trees."

Too much pressure may be given to the soil about the roots in planting, but generally the error is in the opposite direction. To crowd the soil under and around the roots and press it firmly, a pointed stick is often better than the foot.

In planting, the tree is placed in the hole at the same depth it grew in the nursery if the soil is of the same character, a little deeper if it is lighter, and perhaps a little nearer the surface if heavier, and after carefully spreading out the roots it is ready for the covering. Only fine, moderately rich soil should be used for filling in around the roots, and this should be carefully worked into place with the hands and firmly pressed, until all the roots are covered two or three inches deep, when the work may be completed by treading down and tamping, taking care that the bark of the roots is not injured in the process.

After the fine soil to the depth of three or four inches is firmly pressed in place that remaining is thrown loosely on top and *not trodden* at all, thus serving as a mulch. When the soil is compacted on the surface, it is in condition to carry off the moisture rapidly, but if it is light and mellow its capillary condition is broken up and the moisture cannot escape.

Watering at Planting

If the soil is fairly moist and firmly pressed about the roots, there is no need of applying water to the roots of trees at planting; but if in a very dry state, water may be used in the hole before setting the tree, filling it up several times, and after it settles away put the tree in place. Another very good way of watering in a very dry time is, after the roots have been covered with three or four inches of soil, if water is filled in two or three times and be allowed to settle away, and then the surface-soil be filled in light and loose, better results will be obtained with a few pail-fuls of water than if large quantities are used on the surface after the tree is planted. Little benefit can result from the application of water to the surface after planting unless a large quantity is used, so as to saturate the soil down to the roots, for the diffusion of water through the soil when applied to the surface is so slow that it will take a long time to obtain this result; besides, this surface-watering compacts the soil so that after it is done the moisture escapes more rapidly than before. This evaporation after watering may in a measure be prevented, however, if the surface-soil is stirred up with a fine rake two or three inches deep, the fine soil serving as a mulch.

Mulching

Many newly planted trees start into growth in the early summer and then from lack of moisture fail to grow. Where water is not available a mulch of some coarse organic matter, like straw, meadow hay, corn-stalks, fine brush, weeds, or even planing-machine shavings or spent tan-bark, covering a considerably larger area than the size of the hole in which the tree was set, will aid in keeping the moisture from

escaping. This should not be put on more than two or three inches in thickness, for if too thick it causes the roots to grow near the surface, when they would be more liable to injury during the winter or in extreme dry weather.

Keeping up an After-growth

When the trees are planted, it must not be expected that the end of one's work has come, for unless the soil is naturally very rich or is made so by heavy manuring at planting, trees will not continue to grow without some additional plant food each year. When planted on the lawn, if the grass is clipped once or twice each week and liberally dressed in the fall or spring, little or no further fertilizing for the trees may be needed; but even under this condition a mound of manure banked against the trunks before the ground freezes in the fall will be of great protection to the collar or crown of the roots. This method of manuring trees in poor soil is advisable, a liberal supply being used, and in the spring spreading it around on the lawn about the trees. Commercial fertilizers, like ground bone and potash, fish and potash, or even the specially prepared fruit-tree fertilizers, may be successfully used.

The Arrangement of Trees

Trees are arranged or grouped together in ornamental gardening to accomplish the following results: for shelter from cold winds, for screens to shut out objectionable views, and in groups alone or combined with shrubs and the lawn for ornamental effect or to serve as a background for or setting to the house, thus completing or finishing the home-picture.

TREES FOR SHELTER

Scarcely a location can be selected where there is not some point that needs protection or shelter from prevailing winds or from storms, and generally only those trees that are very hardy and provided with an abundance of thick tough foliage should be used. They are more commonly planted on the north or west exposure, and should be set as closely as possible and have them grow to a good degree of perfection. About the average distance for planting evergreens: For high screen or shelter, Norway spruce 15 ft. high, 8 ft. apart; Siberian arborvitæ 10 ft. high, 5 ft. apart. Distance for planting deciduous trees for high screen or shelter: Honey locust 10 ft. high, 4 ft. apart, 8 ft. high, 3 ft. apart. If immediate shelter is needed, close planting may be advisable, but the surplus trees should be removed as soon as they begin to interfere with the perfection of those desired for permanent growth. It is always best to plant those that are the most desirable for permanent growth at the proper distance for full development, and then arrange the more temporary kinds so that they may be finally cut out. In this work, as in all grouping of trees and shrubs, it is best to obtain as much contrast and variety of form and color as possible, and yet have a pleasant blending of all the characteristic features.

Evergreens are generally planted for purposes of shelter, as they hold their foliage during the winter, though a mixture of deciduous and evergreen trees will give the most satisfactory picture in summer. The evergreens, especially when massed, produce a sombre effect, which is lightened and relieved by the introduction of some deciduous trees, like the birches, golden willows, etc. Fig. 29 shows a very good deciduous tree wind break, but should have branches lower,

and wou'd be more ornamental if planted as in Figs. 30 and 31.

The larger and more stately trees should be set at the rear of a corner group, or, as in Fig. 31, in the centre of isolated groups, the smaller or more graceful and ornamental kinds being grouped about them, and if possible so that there may be a gradual diminution in size at all points of view from the centre to outside of the group.



FIG. 29.—Trees for Screen Set in Too Formal Manner.

The size of the trees to be used must vary with the extent of the grounds on which they are planted and the height of the desired shelter. On very small lots a single large tree with a few smaller ones grouped around it will afford much shelter.

TREES FOR SCREENS

The useful and ornamental may be combined with good effect in grouping trees for screens, i.e., to cut off objectionable views or to enhance the beauty of desirable ones. The same rules should be observed in their arrangement as in planting for shelter. The effects to be obtained in this kind of grouping are many. Unsightly objects viewed from the house may be covered or hidden from view, as well as objects on the grounds that it is desired to screen from the house or from public view, as the clothes-yard, stable



FIG. 30.—Trees for Screen in Natural Group.



FIG. 31.—Large-growing Trees Arranged in Centre of Groups.

and other outbuildings, etc. The quiet retreat where one may be away from the public gaze is a feature to be desired in every more or less thickly settled community, but the great mistake often made of planting a close hedge or screen *around the entire grounds*, shutting off all view from both inside and outside, should be avoided.

The ornamental features of our grounds should be made

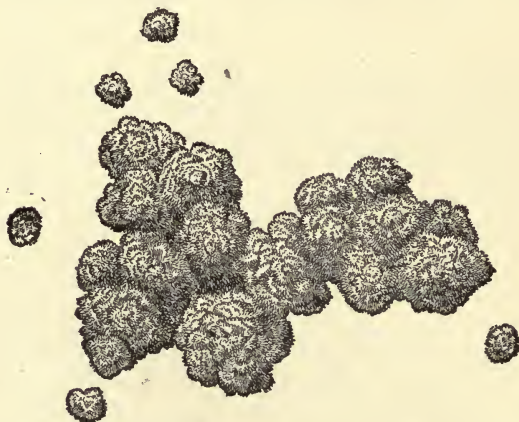


FIG. 32.—Natural Grouping of Large and Small Trees.

with the view of adding as much of beauty and comfort to them as possible, and if we succeed in creating anything of beauty or comfort others are entitled to share it with us to the extent at least of looking upon its beauty.

Fig. 32 also illustrates natural grouping.

Grouping for Ornamentation

When neither shelter nor screens are needed, ornamental trees are planted as a setting to the buildings or for the decoration of the grounds, and in this work much knowl-

edge of the various forms, colorings, and distinctively characteristic feature of trees is needed. The more one studies trees and shrubs and their artistic grouping the greater will be his success.

But in this grouping the effect both of shelter or screens and of beauty may be obtained by careful study of materials and their skilful arrangement.

NATURE AS A GUIDE

In nature we sometimes find most beautiful illustrations of the grouping of trees, on knolls, in the shady dell or open field, and much may be learned by following this most versatile teacher. In many cases, however, art can improve upon nature. We can improve upon most of the effects we find about us by providing the best possible conditions of soil and surroundings for the development of each specimen. We can collect from all quarters of the globe the most beautiful of her treasures, and make each and every specimen of a group grow to its greatest perfection, which seldom occurs in nature's grouping. We can create nothing, but we can use all of nature's blessings so that beauty and good may be the result.

TOO CLOSE PLANTING

One of the greatest mistakes made in grouping ornamental trees is too close planting, as has been suggested on a previous page, and shown in Fig. 59, and unless immediate results are desired each specimen should be given space sufficient for its full development. In this work as much variety is desirable as it is possible to obtain and at the same time secure harmony of forms and colors.

RULES FOR GROUPING

1. Groups of trees of similar characteristics should generally be avoided unless the place is of large extent. If we plant all conical trees, like the spruces, larch, Lombardy poplar, fastigate oak, etc., all low-growing spreading trees, all trees with yellow foliage or those with purple foliage, by themselves, we do not get as pleasing results as if a variety

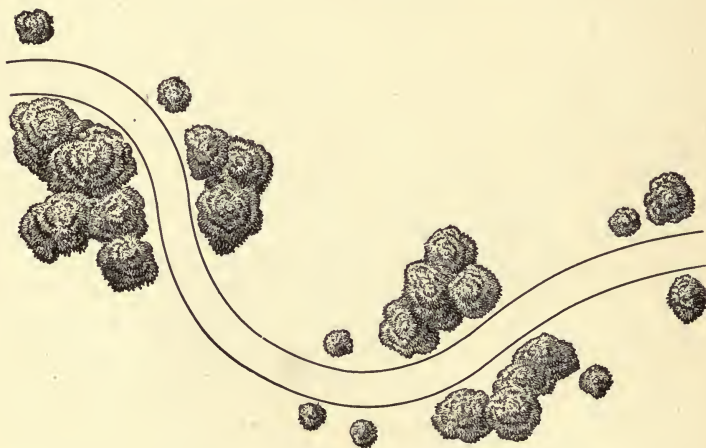


FIG. 33.—Trees and Shrubs Grouped Along Walks and Drives.

of forms, colors, and sizes are used and are arranged in a natural and artistic manner. In Fig. 32 we have a very pleasing arrangement of large and small trees and shrubs, as well as a pleasing blending of forms, each placed so as to bring out the peculiar features and all producing a pleasant picture. In Fig. 34 is illustrated the grouping of trees and shrubs along the borders of a walk or a curved roadway, in which vistas are left open. The larger and heavier trees are grouped in the centre and the smaller ones around them.

2. As in the arrangement for shelter or screens, so in the ornamental groups the tallest trees and those most spiry will be more pleasing if grouped in the centre or back-ground, with the lower, more rounded or graceful kinds placed in order of size, keeping in mind, of course, variety and contrast, and yet securing harmony of colors as much as possible. Trees with very heavy or dark foliage should not be planted by the side of those with light, feathery or very fine foliage, but something of an intermediate tone

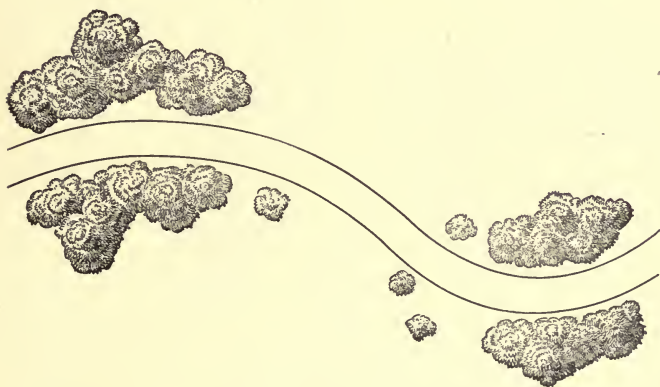


FIG. 34.—Trees and Shrubs Grouped Along Walks and Drives.

should be introduced between them. So a very small tree should not be planted close up to one of large size if its branches are carried high, but if the branches come to the ground with a broad slope, as in Fig. 32, both a distant and close planting will be pleasing.

3. The trees having the greatest individual beauty should be put in such position that their beauty will be enhanced by having a good background or a good setting. Thus the appearance of a purple-leaved beech will be improved if planted in front of or in the angle formed by silver maples

and golden poplars. The foliage of trees like the golden poplar, maple, or elm will be injured in effect if planted in contrast with trees of a bluish or very glaucous color, while trees with showy flowers will be made more conspicuous if

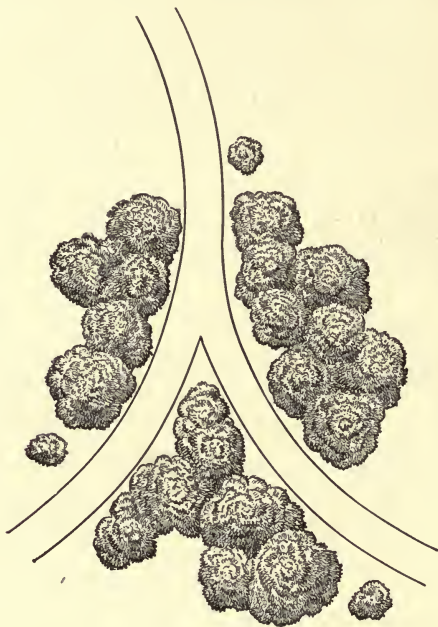


FIG. 35.—Trees and Shrubs Grouped at Branching of Walk or Drive.

planted with a mass of dark-colored foliage for a background.

4. Specimen trees, i.e., those that stand out on the lawn conspicuously, should be those of characteristic beauty. The oak has the characteristic beauty of strength; the elm that of graceful, arching form; the purple beech, Nordmann's fir, and the Colorado blue spruce great beauty of

coloring; the cut-leaved weeping birch and Japanese weeping cherry the beauty of graceful, flowing outline; and each and all of the more common ornamental trees have some characteristic beauty which it should be the study of the landscape artist to bring out in grouping them together.

5. Groups should not be planted so as to present a too solid appearance, and if arranged so as to give each specimen its proper distance and setting there will be little danger of this result. To still further lighten up a group

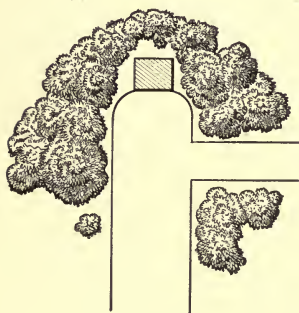


FIG. 36.

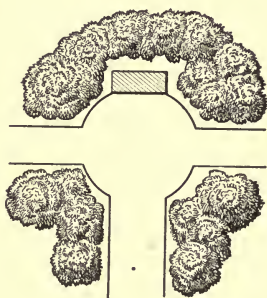


FIG. 37.

FIG. 36-37.—Trees and Shrubs Grouped at End or Turn of Walk.

that has a tendency to too much compactness, small isolated specimens in the lawn at a little distance from the outside tree may be planted, as shown in Figs. 29 and 32.

6. Where the surface of the lawn is rolling, instead of arranging the trees, as in Fig. 29, much better effect will be produced by dividing the group, as shown in Fig. 30. In this way a much smaller number of trees will give more real beauty to the grounds than if all were planted in a line or a close group.

7. When planting along walks or drives, an effort should

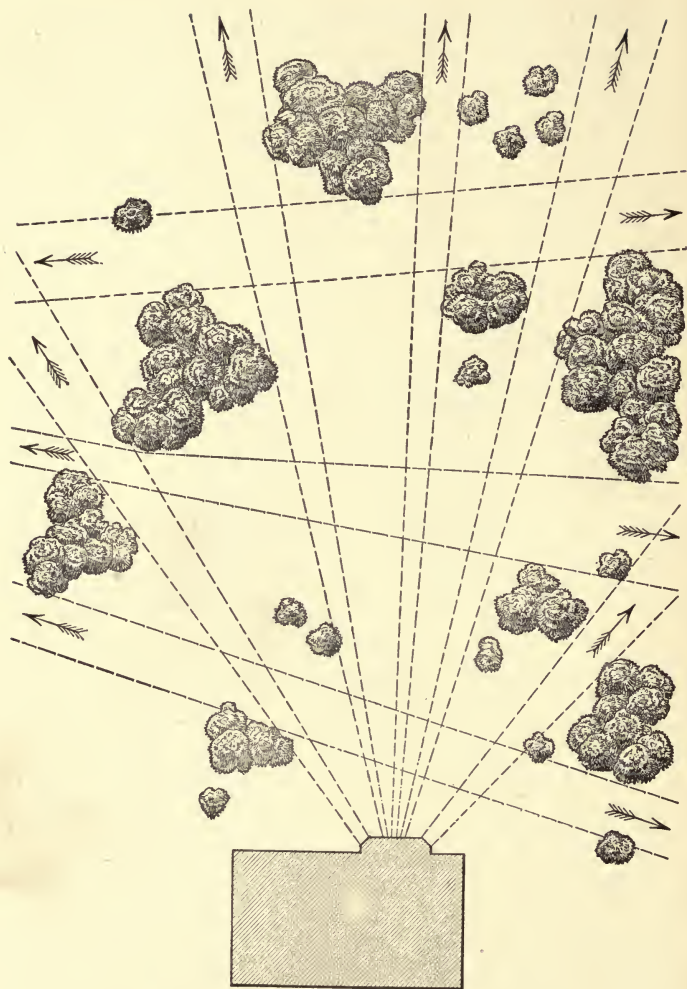


FIG. 38.—Trees and Shrubs Planted Along Many Radiating Lines to Afford Vistas in Many Directions.

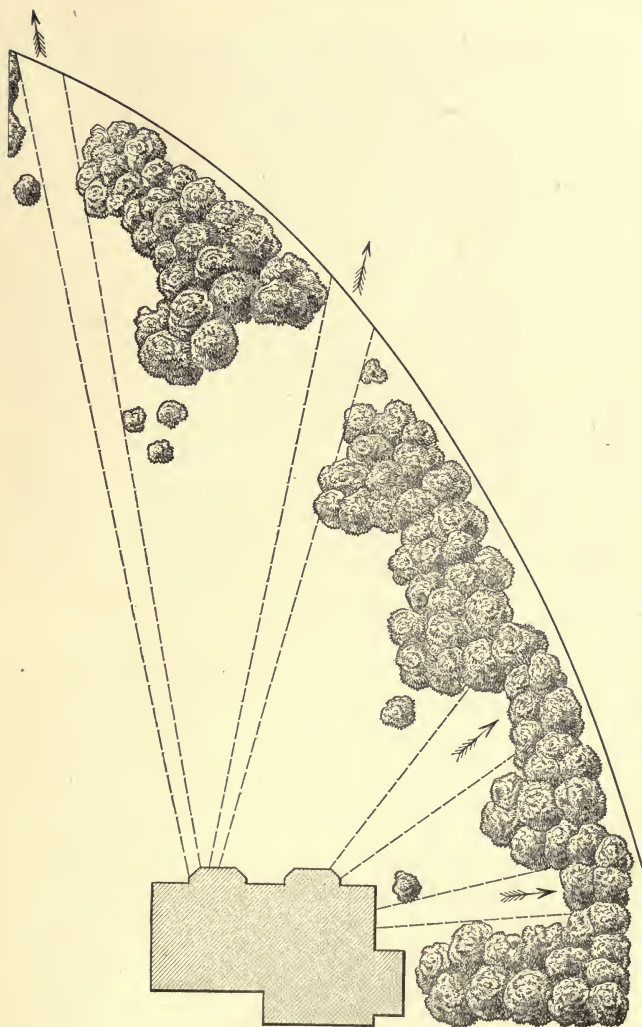


FIG. 39.—Trees and Shrubs Planted Along Radiating Lines to Afford Vistas.

be made to group as naturally as possible and, if the curve of the walk or drive is made to extend around and beyond what seems to be the natural and direct line of travel, to so place the trees or shrubs as to overcome the feeling that a greater distance is being travelled to go from one place to another than is necessary. A very good idea of this grouping is shown in Figs. 34 and 35.

8. Vistas or openings should be provided wherever interesting objects or views are presented, and the arrangement of trees and shrubs be in radiating lines, as shown in Figs. 34 and 35. In this manner vistas or pleasing views may

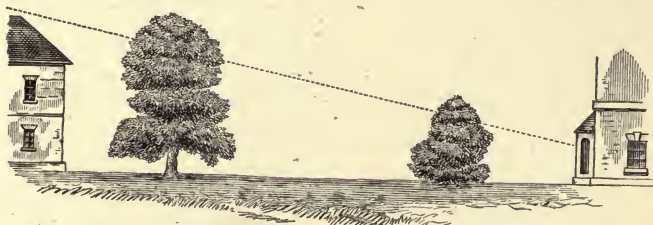


FIG. 40.—Screen at Different Angles.

be arranged from the prominent points of the house, as from the verandas, bay windows, or piazzas, from various points on the lawn, and the planting may be so made that the pleasing features of the grounds may be enjoyed by those outside. Considerable skill will be required sometimes to afford a screen at certain points from an intrusive public, to open views to others, and at the same time to secure the best of the outside beauty to the occupants of the house. Very pretty views or vistas are shown in Fig. 14, p. 35 and Fig. 41, p. 75, and Fig. 42, p. 76.

9. If the groups are planted near the house, trees or shrubs of small size will often cut off objectionable views which would require much larger specimens if planted at



FIG. 41.—Vistas through Trees, Shrubs and Plants.

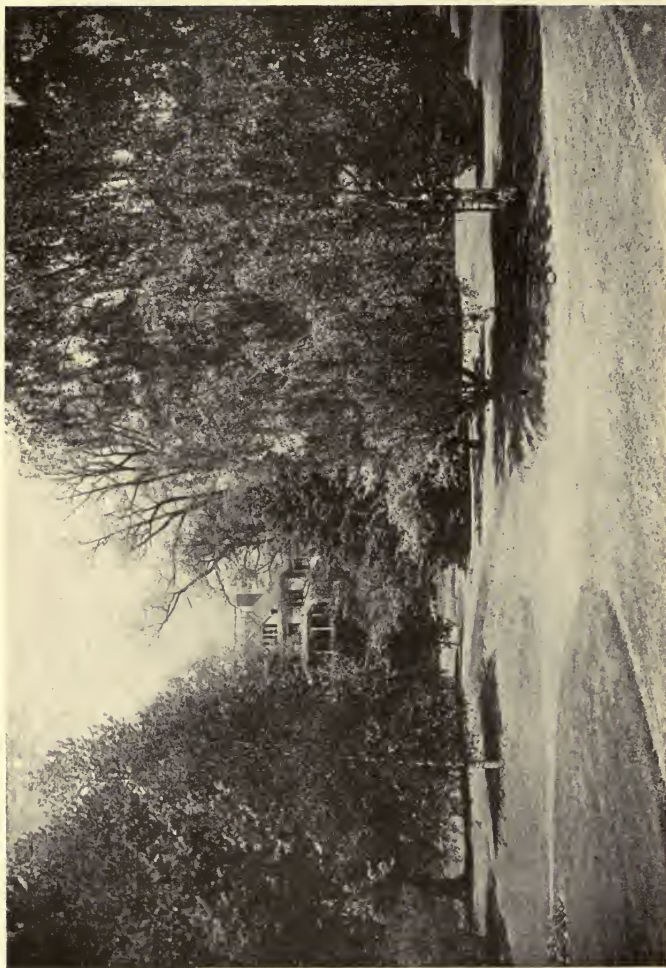


FIG. 42.—Vistas through Trees and Shrubs.

greater distance, as shown in Fig. 40. In case of large trees near the dwelling vistas may be obtained from under the branches, and a tree well headed up gives an abundance of shade and at the same time a good circulation of air, which are very desirable during the hot summer months.

10. The beauty and comfort obtained in all this work of grouping depend very largely upon how carefully every point suggested above is studied and viewed from all sides, and how fully the planter understands the height which each of the species planted will attain under different conditions

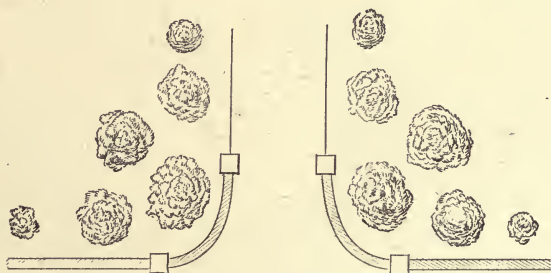


FIG. 43.—Groups of Trees and Shrubs at Entrance of Grounds.

of soil, exposure, etc.; for while the trees are young the vistas and covering may be just right, it may take but a few feet of growth at one side or above the group often to hide from view some of the most beautiful features of the place.

11. Groups of trees are generally in good taste planted on both sides of a walk or drive at the entrance from the street, Fig. 43. Arranged in this way they serve to mark the exit or entrance in a definite way when seen from a distance or during the night-time.

12. Corners or abrupt angles in the boundary-line may be filled up with trees and shrubs so as to present a most

pleasing effect, not secured if these features are left without decorations.

13. In nature we often find most beautiful groups of trees on the tops of rounded surfaces which we may well copy in this particular where such features of surface are found. This point is shown in Fig. 44, and if, as in this illustration, some picturesque or strikingly beautiful tree is planted in the group it is sure to attract attention.



FIG. 44.—Trees and Shrubs Grouped at Crown of Rounded Surfaces.

14. To cover up or to break the monotony of a straight line of trees, a hedge, or a bank wall, trees and shrubs may be grouped in a more or less irregular yet artistic manner some distance away with very pleasing effect.

15. In the grouping of trees and shrubs there should be an effort made to obtain vistas of *as great extent* as possible in one or more places. By such an arrangement even small places will appear of much larger extent than if only short *vistas* within the grounds are provided, and more pleasing

to the eye from the fact that a greater variety of objects may be seen at once. Also to cover *porte-cochère* or covered driveway, as in the frontispiece.

16. Ornamental grounds will be pleasing in proportion to the number of beautiful pictures presented. If all parts are seen at one time, interest is soon satisfied. It is possible, however, to provide very many pleasing features on places even of small extent if the foregoing rules are carefully studied.

17. As stated in a previous chapter the lawn is the most important part of the home picture and this feature should not be obscured by too close or too extensive planting of trees and shrubs. Two or three trees or shrubs planted near the border of the lot, a group of low shrubs or hardy plants close up to the house, Fig. 45, or stable, with a specimen small tree with showy flowers or foliage will often give more of real beauty than if dozens were planted.

Trees and shrubs should never be planted at regular distance apart, but in groups, the lawn in all cases predominating.

Grouping about Buildings—Banks of Shrubbery

18. Trees and shrubs, as well as some of the taller hardy herbaceous plants, may be used as a setting for the house or outbuildings, banked as shown in Fig. 45. Trees may be planted on either side of the front, in some cases, or only on one side with pleasing effect, if the buildings are small so as to be shaded more or less by the roof. If placed too close and the roof or sides are kept moist continually they cause decay of the clapboards or shingles. When the building faces the north, the shade should be located on the south or rear of the building.

19. The abruptness of outline between lawn and foundation may be very pleasantly broken by grouping small

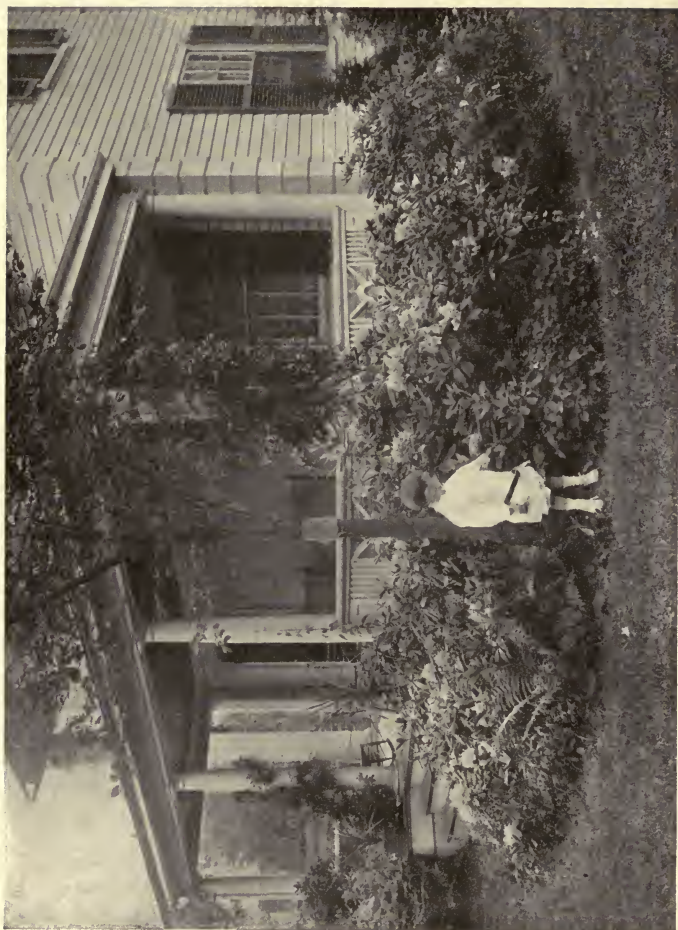


FIG. 45.—Shrubs and Plants Banked against Veranda. (Kelsey.)

evergreens, flowering shrubs or even hardy herbaceous perennials in masses close up to the underpinning, planting the taller ones in the rear and grading down to the very low ones in front next the lawn as in the above figure. If planted directly under the eaves some sort of a snowguard must be provided in sections where the fall is heavy, otherwise many of the plants will be broken down in winter.

CHAPTER V

SHRUBS, HEDGES, AND HARDY CLIMBERS

SHRUBS may serve under some conditions, e.g., on small places, the purpose of screens when planted near the buildings, or near the street when the land slopes upward toward the house, but in very few places can they be used for shelter. They are especially adapted to add finishing touches and cause a blending between the trees and lawn or for massing in ornamental groups on small grounds.

They present a much greater variety in form, size, and color than the trees. Among them we have the most beautiful colors and variegations of foliage, the most beautiful grace of outline, and the greatest variety of forms and colors of blossoms, coming on more or less from the earliest spring to late summer or early autumn, which afford material for the most beautiful effects. Being small they will give a much greater number of forms and colors on places of limited size than can be obtained from the use of trees. For description of shrubs see Chapter XII.

Preparation of Land, Planting, Grouping, etc.

The preparation of the land, the pruning preparatory to and the planting of shrubs, are so similar to those required for trees that directions need not be repeated here. The same rules also as for trees should be followed in regard to individuals or groups as to distance, blending of colors and forms, etc.

TWO METHODS OF GROUPING

Two methods of grouping are commonly practised, i.e., 1st, the grouping of many flowering varieties in one mass whereby some kinds may be in bloom at all times from April to November, and 2d, the arrangement of large masses of one species or variety together so as to produce very marked and distant effect. The former will generally give the most satisfaction on small grounds, but on places of considerable extent the most pleasing results will be obtained by planting many specimens of one kind in a group. For example, large groups of *Forsythias*, *Spiræa Van Houttei*, *Hydrangea paniculata*, Japanese snowball, etc., arranged in large masses by themselves, present beautiful views and strong contrasts that cannot be obtained in any other way.

At the entrance of the grounds, as in Fig. 43, beside the walk or drive, or at their forkings, as in Fig. 35, groups of shrubs fix our attention and we pass on or change from one walk to another less conscious of the change of direction than if only the plain walk was before us.

Another use of shrubs may be found in their serving to give a reason for abrupt changes of direction or the termination of a walk, as shown in Figs. 36 and 37, and also to make a curved walk on small grounds appear the most natural and the shortest distance between two points, as in Fig. 34.

Change of curves in walks are made to appear more natural if the borders are more or less decorated with shrubs at points where there would be a temptation to cut across to shorten the distance, as in Fig. 34. They also serve to cover up and break the monotony of the walk by obscuring changes until it becomes necessary for one to make the turn to reach one point or another. A combined group of trees and shrubs illustrating the shrubs planted a little way from the trees is shown in Fig. 31.

PRUNING SHRUBS

In pruning shrubs they should be allowed to take their most natural and perfect form; and, when branches become old and weak, they should be cut away *from the inside*, thus thinning out and allowing new vigorous shoots to grow to take their place, as at *a*, Fig. 51.

The practice of shearing shrubs on the outside only, without thinning out any of the inside branches, cannot be too severely condemned, for it not only gives them an unnatural form in which there is little or no beauty, but it causes an increase in the number of small and imperfect shoots at the end of every branch cut, thus shutting out the sunlight and resulting in a very imperfect growth, that produce very few, if any, flowers.

The best blooms of some kinds of shrubs are borne on wood of two or more years' growth, and the *annual winter or spring pruning* as often practised destroys much of this growth and forces the shrub to make wood at the expense of blossoms. In the case of the Hydrangea and Hibiscus, however, which bloom late in the season and from the new shoots, annual spring pruning of the old wood will result in larger and better flowers. Early-blooming shrubs like the spirea, weigela, forsythia, lilacs, exochordia, etc., may be trimmed in early summer just after blooming with the best results; while the hydrangea, althea, and clethra, etc., should be pruned in late fall, winter, or early spring. If a long time unpruned, whether in groups or planted singly, most shrubs become irregular in form and lose their beauty, but by careful pruning and proper arrangement, beds or groups of shrubs may be made to keep as good form and appearance for many years as if newly planted. The larger-growing shrubs should be planted in the centre or front and the smaller ones on the border of the groups, each kind thus

showing its natural size and beauty if given space for full development.

Hedges*

The arrangement of trees or shrubs in the close form of the hedge is under some conditions desirable and can often be done with pleasing effect, though generally only the very low hedge—one to three feet high—can be considered decidedly ornamental.

For the complete seclusion of the nursery and playground, the clothes-drying yard, etc., or where the space is very limited, the large hedge is sometimes allowable, though difficult and expensive to keep in perfect shape after eight or ten years old.

PREPARATION OF LAND

To make a satisfactory hedge, the ground is to be as well prepared as for the growth of trees or shrubs under any other conditions, and as the plants are set out more thickly than where grouped for ornamentation, it should be made richer by an additional supply of suitable plant-food. If trees and other shrubs are growing on the same grounds annual dressings of plant food like fine stable manure, or lawn fertilizers should be made to keep them all in a vigorous growing condition.

AVOID CLOSE PLANTING

One of the greatest mistakes made in planting hedges is in the distance at which the trees or shrubs are planted. When set one foot apart or less, as is sometimes practised, if the kinds of plants used naturally grow to large trees, as with the hemlock, spruce, arbor-vitæ, honey-locust, etc.,

* See description of hedge-plants, page 216.

some of the plants will grow more rapidly than the others, some will die out, and all will be seriously injured by the attempt to grow them in so contracted a space. The distance best for planting must vary with the variety, but they should have room enough to enable them to make a sufficient growth to keep them in a healthy condition. Norway spruces, hemlocks, large forms of the arbor-vitæ, honey-locusts, etc., for a hedge six to eight feet high, should be planted five feet apart at least, and be forced to spread out and grow laterally by cutting in at the top until strong main branches are formed near the ground. If a low hedge or immediate effect of a high hedge is desired, the plants may be set closely, and when they crowd be transplanted again with a little greater distance between them, or every other one be taken out. In this way, if plants are set over only one-half of the line desired at first, as they crowd the line can be extended at less expense and with better results than if the whole distance were planted at once with trees of larger size.

REQUIREMENTS OF A PERFECT HEDGE

The first requirement of a perfect hedge either for beauty or for a perfect screen is *numerous main branches close to the ground*, and at transplanting, unless the plants have been specially prepared in the nursery, they should be cut back severely to encourage this condition of growth. It is not often possible to obtain hemlocks and spruces in proper condition for a perfect hedge, they not having been cut back while small, and they cannot be so severely pruned as can the deciduous trees; but the Japanese quince, buck-thorn, privet, etc., can and should be cut down to within six inches of the ground at planting, even if of considerable size, and be kept low until sufficient strong lateral branches are developed to insure a close and healthy growth

near to the ground. This may seem like severe treatment, but, as all trees or shrubs when planted closely tend to grow only at the top, in no other way can a perfect hedge be made that will grow a long time without becoming broken and irregular from dying of some of the branches or even the whole plants. After the necessary lateral growth has been obtained the top should be cut a little higher each year until the desired height has been reached. The point at which to cut and the results of this pruning are illustrated in Figs. 46 and 47, the dotted line *a* showing the point of first pruning.



FIG. 46.

FIG. 47.

FIG. 46.—Illustrates Cutting Back of a Hedge.

FIG. 47.—Illustrates Results of Cutting a Hedge.

The effect of this pruning is shown in the three trees at the right, the line *a'* showing where the second pruning should be made.

FORM OF HEDGES

Of the many forms to which hedges are pruned, a satisfactory and permanent growth will be obtained only by the triangular or conical shape, Figs. 48 and 49. When the sides are pruned perpendicularly, as in Fig. 50, there can be but little growth except at the top, as at *a*; while in the conical or triangular form the tendency will be to grow upward from all points along the sides, as in the above figures, the sides being thus kept well covered with foliage and new growth.

PRUNING HEDGES

As in pruning specimen shrubs, continual shearing at the ends will cause a more or less close, defective, and unhealthy growth, and here and there over the hedge weak branches should be removed at considerable distance toward



FIG. 48.



FIG. 49.



FIG. 50.

FIGS. 48, 49.—Correct Form of Hedges.

FIG. 50.—Incorrect Form of Hedge.



FIG. 51.—Where Cut should be Made in Pruning.

the inside, which, as shown in Fig. 51, will result in new shoots from near the centre of growth and thus the vigor of the plant will be renewed. A hedge pruned in this way may not present quite so solid an outline, but it has a more graceful appearance, and will keep in a healthy condition much longer than when pruned only at the ends of the branches.

Fig. 156 shows an unpruned hedge of natural growth, while Fig. 155 shows a closely pruned hedge.

TIME FOR PRUNING HEDGES

If it is desired to check the growth, as when the hedge has reached the desired height, the pruning should be done in June or July; but if more growth is desired, i.e., while the hedge is in the formative stage and to produce a lateral growth, the spring, just before growth begins, is the best time for pruning.

IMPLEMENTS FOR PRUNING

For the preliminary pruning or cutting out of branches from the inside the long-handled shears, the common hand pruning-shears and a large pruning-knife are all that are needed, but for giving permanent finished outline the long-bladed hedge-shears are indispensable. To obtain a true outline, strong twine stretched very taut and held in place by stakes is the simplest and most satisfactory method. If the surface of the ground on which the hedge is grown is curved, the top line of the hedge should generally take the same curve, thus making it the same height throughout its length.

A MIXED HEDGE

Hedges of flowering shrubs, where the flowers are the most desirable feature, should be pruned as directed for other flowering shrubs, but the close solid hedge cannot be obtained by this method of pruning.

ADAPTABILITY OF SOIL AND LOCALITY

As with trees and shrubs under all other conditions, the different kinds used for hedges will only succeed under proper conditions of soil and exposure. Thus the hemlock will succeed only when planted in a moist, cool soil, in a cool yet somewhat sheltered location. The arbor-vitæ and

all other evergreens are also often seriously injured if planted where exposed to extremely hot sun, heavy winds, or where passers-by will come in contact with them when frozen. The pines and spruces will grow well in light land.

Most of the deciduous trees and shrubs used for hedges succeed better in exposed places than the evergreens and under more varied conditions, but each must have a suitable soil to grow to the greatest perfection. Almost any soil may be so changed at little expense as to be adapted to the needs of most kinds of shrubs and hedge-plants. If the soil is too light, liberal dressings of stable manure or other organic matter will enable it to retain moisture sufficient for a good growth. If very heavy, sand or gravel worked into it will make it more light and porous. If very wet, thorough drainage will remedy this defect.

The annual dressing of manure or fertilizer recommended for trees and shrubs should be put about the trunk of each plant before the ground freezes, and all leaves and rubbish that will attract mice or other vermin be removed before the ground is covered with snow. No weeds or seedling trees or shrubs should be allowed to get a foothold about the hedge, and in very much exposed places a protection of pine boughs set up about them during the winter until the plants have become fully established will be found very beneficial.

Hardy Climbing Shrubs *

The part that hardy climbers play in the landscape or ornamental art is often very important. As a summer covering for pergolas, verandas and arbors nothing possesses so much natural beauty. They supply the beautiful green so pleasant to the eye, and by constant evaporation of moisture from their leaves produce a cool shade that no artificial

* See description of hardy climbing shrubs on pages 256-266.



FIG. 52.—Vine-covered Cottage.

material can supply. Some of them possess most beautifully cut or shaded foliage, while others produce most beautiful flowers, and when once planted they grow on for many years with but little care. Some of them, like the wistaria, aristolochia, actinidia, bitter-sweet, etc., will twine about large pillars or other supports, some will support themselves on brick or stone walls by their sucker-like tendrils, while many, like the clematis, etc., require the support of the trellis, the single wire, or the wire netting.

If grown too abundantly or trained too closely to the building, vines often render the dwelling damp and unhealthy and cause rapid decay of the woodwork.

As to cultivation, they require the same care and fertility of soil as recommended for upright shrubs. Fig. 52 shows a vine-covered cottage in June.

PRUNING CLIMBERS

In addition to the pruning required to keep climbing vines within proper limits, which can be done largely by pinching and light clipping during the summer, they require in some cases the cutting back of the old wood of the laterals in order to produce fresh clean shoots and foliage, and in other cases the heading in of the young wood to encourage development of the blossom-buds. In a few cases as with roses winter protection should be provided by tying straw around them or covering them with loosely tied matting. Any covering of this kind, however, unless very neatly done, detracts from the appearance of a veranda or arbor and should be avoided if possible.

Hardy Herbaceous Plants *

No class of plants affords more beauty and pleasure for so little expenditure of labor and money as the hardy her-

* See list of hardy herbaceous plants on page 273.

baceous plants. They are especially adapted to small places, and with a background of low trees or shrubs some very beautiful pictures can be formed. As with shrubs and trees, some kinds require special conditions of soil and exposure to be grown successfully, while others succeed on a great variety of soils. Some of them will grow a long time in one place without renewal of soil, but most of them need dividing and transplanting every three or four years to insure the most vigorous growth and the best flowers.

They may be arranged in groups of the same kind, or in mixed groups, as may be desired, with good effect; but on large places generous groups of one kind like paeonias, phloxes, etc., with striking characteristics will be the most satisfactory, while on small places the mixed arrangement may, perhaps, give the most pleasure.

Tender Foliage or Flowering Plants *

BEDDING PLANTS

For many years past it has been the fashion to grow, more or less largely, brilliantly colored foliage or flowering plants in large masses; and while the pleasure obtained by the growth and study of these plants is often very great, the effect produced is sometimes not quite in keeping with the quiet beauty of the refined home. It often partakes more of the nature of "loud dress," much avoided by all people of good taste. Gaudy pattern-beds covering large areas standing out conspicuously on the lawn with nothing to cause a blending of color cannot be considered in good taste, but if placed so that more moderate colors grouped near may tone down their intensity they may not be objectionable.

Small groups of the more brilliantly colored foliage-plants

* See list of bedding-plants on page 295.

or of those with beautiful flowers placed in retired nooks with a good background, along the borders of walks, or close up to the veranda with a good extent of lawn often add to a scene brightness that can be produced in no other way. These bedding-plants, well started under glass, produce effect early and during the entire season which cannot be obtained from perennial plants or shrubs. They often show color or begin to bloom soon after setting out and continue until cut off by frost.

They are comparatively inexpensive if purchased from the commercial grower, or many of them are easily and cheaply grown with only the facilities of a small hotbed or a few sunny windows.

Intricate figures and designs often seen in public grounds and large estates should not be attempted on small places, for, besides being unsuited to such limited areas, they will detract from other features whatever of beauty they may in themselves possess.

CHAPTER VI

WALKS AND DRIVES

Good, dry, and smooth walks and drives are a necessity for comfortable getting about on either the home or public grounds, but they can in themselves add nothing to the naturalness or beauty of any place. One of the first points for consideration, after the house and outbuildings have been located and built, is how to get to and from them, or, in other words, where shall the necessary walks and drives be located.

If we could always walk or drive on the velvety grass of a good lawn without getting our feet wet or killing the grass, gravelled or concrete walks or drives would not be a necessity, we should save much expense, and the beauty of our grounds would be greatly increased; note the lawn in frontispiece; but we can do neither of these; some walks and drives are, therefore, from this point of view, a necessity. We may compromise this matter by using flagstones which will make a very good walk that can be kept in good condition with little expense, Fig. 53.

A properly located walk or drive, however, may be made an attractive feature, as it invites us by its smoothness and dryness to walk or drive over it to the house, or from the house to our daily toil or pleasure. It adds an air of comfort and hospitality to the home that without it would seem cold and inhospitable.

Walks and drives in themselves add no beauty to grounds devoted to the growth of choice trees, shrubs, and plants,

and, as they are unnatural features of the landscape art, only such should be made as are actually required by those



FIG. 53.—Flag-stones in place of Gravel or Concrete Walk.

who frequent the grounds. Besides, a good walk or drive is expensive to construct, and requires constant attention as to border and surface to keep in good condition.

Location of Walks and Drives

The location of walks and drives should be where they will be most convenient, and as nearly as possible give the shortest distance between the points to be traversed, and yet, unless the distance is very short, the straight line should be avoided.

Graceful curves, taking one from place to place about one's ground, give the idea of quiet and leisure that is conducive to the study of beautiful objects about us; and by a little variety of material and skill in the arrangement of it in ornamenting the borders of walks, thus obliging us to move out of the straight line to reach a certain point, we may not be conscious of the fact that the curved walk is any longer than a straight one would be, and much beauty is gained. This is illustrated in Fig. 34; were it not for the groups of shrubbery along the border there would be a feeling of restraint at going over so much distance to reach a point directly ahead, but we are attracted in part by their beauty to pass among them, and, being between us and the objective point, the feeling of restraint disappears.

The Entrance to Drive or Walk

There should always be a walk leading more or less directly to the main entrance of the house; and where a drive must also be provided to the front door and to reach the stable, if space is limited, the two may be combined for more or less of the distance by making that part along the side of the drive intended for the footpath (see Fig. 54) with a little finer gravel or by paving or concreting it.

Where the grounds are small and a "turn around" is needed, this plan is often followed, thus preserving more of the lawn for ornamentation and reducing the cost of construction and care.

Direction of Walks and Drives

The direction of the walk leading from the house to the street should conform to the needs of the occupants. Thus, if the direction of travel is equally to the right and left from the street entrance, the walk should run nearly in a direct line from the main entrance of the house to the street, as in the dotted line, Fig. 55, or in a semicircular direction, as in the same figure; but if the direction of



FIG. 54.

FIG. 54.—Combined Walk and Drive.

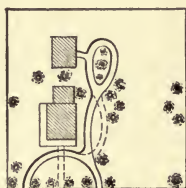


FIG. 55.

FIG. 55.—Semicircular Walk and Drive.

travel is largely to the right or left, then the drive or walk can be directed to the right or left at the entrance, as desired.

Width of Walks and Drives

The width of the walks and drives must vary with the amount of usage. If there is much passing to and from the house, the walk may be made from 5 to 6 feet wide, so that two or three persons may walk abreast or pass each other readily; but if two persons would not be likely to meet frequently, a width of from 3 to 5 feet would be sufficient. For a drive where only one team would pass over the road at a time 8 to 10 feet is sufficient width; but if two teams must frequently pass over it at once, 15 to 18

feet will be none too great a width. The walks and drives, however, ought not to be wider than are absolutely needed, for the wider they are the more they detract from the ornamental features of the place and the greater will be the cost of construction and maintenance.

The Turn-around

Where the butcher, the baker, grocer, etc., visits the house frequently or where one drives in and out frequently the turn-around should be provided. The center of this turn-around may be decorated by a single large tree, by a group of shrubs, the taller planted in the middle, or by herbaceous, or even annual bedding plants. Small evergreens are not very satisfactory in such places as they are likely to be injured in the winter when frozen, by teams, dogs or other animals running against them, or by the burning sun in summer if planted on the south side.

Obtaining the Curves

Too much care cannot be exercised in laying out and forming the curves of walks and drives, for when completed with a proper foundation it is difficult to make a change of location or direction except at large expense.

Most inexperienced persons find some difficulty in obtaining graceful and proper curves, but to the professional landscape-gardener it is a simple matter.

The point of start and termination must be decided upon and also the prominent features that may be brought to view along its course. The walk should be made to pass if possible where pleasing features will be seen, and not where those of an unpleasant character will be brought to view.

Many means are employed to obtain the desired curve. If an engineer is employed, this is quickly and very accu-

rately done with surveying-instruments; but for all ordinary work it can be done with sufficient accuracy by the eye, setting up small stakes at regular intervals, as in Fig. 56, and sighting along until the line is covered (the more abrupt the curve the closer the stakes must be set), then viewing the stakes backward and forward once or twice, changing here and there until a satisfactory curve is obtained. The

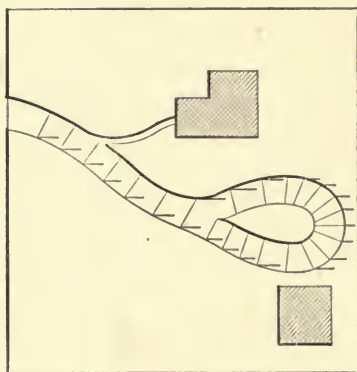


FIG. 56.—Method of Obtaining Curve.

desired width at all points is then obtained by measuring the same distance from each of the stakes to the opposite side of the walk. On large grounds a carriage driven rapidly and skilfully over the surface will make very regular and graceful curves. The bicycle also may be brought into use for this work, or a stiff rope or rubber hose laid on the ground and moved until the desired curve is obtained, the mark to be made by pressing it into the soft soil with the feet, or if in grass the curve made in the above way may be located by setting up small stakes at frequent intervals along the line of rope or hose. After the curve is laid out

permanent stakes should always be set firmly enough so that they may not be moved until the work of grading, filling, trimming, and smoothing off is completed.

Construction of Drives and Walks

A good walk or drive cannot be made on a poor foundation, any more than a bridge or a house. A foundation must be provided that will not allow of settling unevenly by the action of frost. Standing water under the walk will also cause uneven settling, and one of the first steps to take in providing for the foundation is the removal of any surplus water. If not naturally underdrained, a tile or stone drain should be laid not less than $3\frac{1}{2}$ feet below the surface, and if the land is very wet and the walk wide a line of tile on each side, Fig. 57, may be necessary. On a side-hill a deep-laid drain on the upper side, Fig. 58, a little distance from the walk will often be more effective than if laid directly under it. If the whole lawn is well underdrained, no other drainage need be provided except that obtained in construction.

To provide a walk that shall be dry at all times and especially after very heavy rains, the material of which it is made should be of very porous character. This condition is best obtained by excavating the whole space to be covered from one to two feet deep and filling in first with boulders and rocks, then with smaller stones and coarse gravel, and finally with gravel from which most of the sand or loam has been screened.

The rocks and boulders should be first packed as closely as possible, then the small stones filled in about them, and then the coarse gravel packed and tamped down thoroughly. If a heavy roller is obtainable and can be used at the different stages of construction, this will be the best means of

compacting each layer, but if not, a heavy iron or wood tamper, used skilfully, will do good work.

A walk constructed as above described will remain firm and dry for a great many years, and will require little labor to keep it in a neat condition and free from weeds. The surface of such a walk may be made nearly flat, while if



FIG. 57.—Section of Walk or Drive Showing Location of Tile.

good material is not available and a good foundation is not provided it must be made crowning in the middle, and the poorer the material the more crowning it must be and then not be wholly satisfactory. The materials of which the walk is constructed should not be filled above the level of the lawn on a sloping surface unless found necessary, as the



FIG. 58.—Section of Walk or Drive on Side Hill.

surface-water during heavy showers would accumulate, washing out the gravel. Should such a form be necessary, this danger should be provided against by making a gutter along the upper side of the walk, with catch-basins into drain tile or a tile culvert to carry the water under the walk. This gutter may be made as a part of the walk with paving-stones or asphalt, Fig. 58, or a very good one can often

be made in the turf without disfiguring the lawn (see Fig. 57).

To prevent washing, care should be taken that no basins be formed by the walks or drives as they pass through the valleys or turn along the face of a slope, and if such become a necessity culverts of stone or tile should be put under them so that the water may pass to the other side before there is much accumulation.

The edges of the walks and drives will need more or less attention at all times to keep the grass from growing in and forming irregular borders, and trimming is best done with the "edging knife." The surface also will need an occasional raking or smoothing over, and once in two or three years a dressing of screened fine gravel or sand will greatly improve the surface and keep it filled up to the level of the lawn.

If the workmen employed cannot cut the edges to true curves by the eye, the garden-line should be stretched and stakes set at frequent intervals along the curve until a complete and perfect curve is outlined.

All weeds should be removed before they become so fully rooted as to require the hoe or hook to remove them.

On the drives all loose stones or those projecting above the surface should be removed at once, for, besides the discomfort they cause the traveller, they are seriously injurious to both the carriage and the road.

CHAPTER VII

RENOVATING AND IMPROVING OLD HOMES

THE established home is often far more difficult to treat than where the land is clear and new material only is to be used. It often is also the case that there are objectionable features that must be removed before anything like real beauty can be evolved; as, for example: 1st. Trees, shrubs, and vines may be so closely planted and so entangled that none of them can ever be made beautiful objects. This is shown to some extent in Fig. 59. 2d. There may be unnatural embankments, slopes, terraces, or basins. 3d. Bank walls, unsightly fences, and improperly located buildings. 4th. Unnaturally located and unnecessary walks and drives.

In other cases much valuable material may be found in a condition that, with a little proper care, may be easily improved so as to become objects of great beauty in a much shorter time than if new trees or shrubs were planted.

When a place is taken that has for a long time been under neglect or improper care, the walks overgrown and trees and shrubs more or less a tangled mass, there seems to be but one of two things to do, i.e., to either cut down everything on the place, clear up and grade the land, and begin as in a new place, or to thin out some of the least desirable and trim up those of value and plant other desirable trees and shrubs in proper relation to each other among those standing (removing, of course, such as will absolutely prevent the growth of the new ones), give them careful



FIG. 50.—Result of Too Close Planting.

fertilization, and then remove the old trees as soon as the new ones have made growth enough to serve the desired purpose of ornamentation.

Preserving and Improving Deciduous Trees

In some cases deciduous trees may be found that by severely heading in, as in Fig. 24, at the dotted lines *a*, in a few years will become symmetrical and well-formed trees, as in Fig. 20. Such trees as the elm, oak, maple, and many others are very easily renewed in this way, but the evergreens when once they have lost their lower branches can never be renovated without great expense and loss of time.

Renewing Shrubs and Hedges

Overgrown shrubs may be more easily renewed than large trees, as they will stand more severe pruning. If very much overgrown and in clumps, a part of the main clump



FIG. 60.



FIG. 61.



FIG. 62.

FIGS. 60-62.—A Shrub Divided and Pruned for Transplanting.

may be dug up and the remainder severely headed back, when a wholly new top will be formed. This is illustrated in Figs. 60 and 61. If the soil be then enriched and a little pinching in of the strong-growing branches that tend to outgrow the others be done during the summer, bushes of large size may be made in a very short time to take perfect form, and often with far less labor and expense than if young

shrubs were planted. After being well established, the after pruning given should be in the direction of the dotted line *a*, Fig. 47.

Hedges like the honey-locust, Osage orange, buckthorn, privet, and Japan quince, which have long been neglected, may often be renovated by a little heroic treatment. Fig. 61 is a sectional view illustrating the condition in which neglected hedges often are found. By cutting this hedge at the dotted line, and then as the young shoots grow unevenly pruning off the ends of the most vigorous, a uniform height and a low-branching condition may be soon attained, without which no hedge is either ornamental or useful.

A hedge is under some conditions an ornamental feature of a landscape view and often serves as a screen from some unsightly object; but generally there is little of the ornamental or useful about it. Where growing on old places in nine cases out of ten it will be found that more pleasing effects may be obtained by the removal of such a hedge, and grass and a few naturally formed trees and shrubs planted about the place occupied by it than by trying to renew its growth as a hedge. Evergreen hedges, when not too large, may be renewed by the heroic treatment, but it takes several years after heading in for them to become again covered with foliage so as to be ornamental.

For full description and care of hedges see Chapter V.

Renovating Hardy Herbaceous Plants

On many an old place may be found more or less of those most interesting and desirable hardy herbaceous plants, like peonies, phloxes, larkspur, iris, etc., that may be utilized in the decoration of a home. Generally they are root-bound among grass and shrubs, and can never be made of any value unless taken up and transplanted to good, clean, well-enriched soil. In doing this only the *strong*

young roots should be used, and all grass and weeds should be carefully separated from them.

The fall is a good time for this transplanting, though it can be done successfully early in the spring before much growth has taken place. If the land in which they are to be transplanted is not in a proper condition, the plants may be put in good garden-soil for a year or two, where they will be greatly improved and be ready for removal when a proper soil-bed is ready for them.

If the owner of a newly purchased old place is not familiar with the trees, shrubs, and plants on the grounds to be renovated, he should consult some one who can tell him of the value of each, that only those of value may be saved.

Renovating the Lawn

The lawn or the grass in and about the grounds of most old places has generally been so long neglected that weeds and wild grasses have taken possession and driven out the finer kinds that give the green velvety carpet, without which any place, no matter how lavishly planned or grandly built, looks unfinished. The first thing to do with the old lawn, if under such conditions that the land can be ploughed or otherwise worked deeply, is to turn the sod under, manure heavily, cultivate thoroughly for one or two years until the wild grasses and weeds are subdued, and then reseed in August or April with 1 to 2 bu. June-grass, 1 to 2 bu. red-top, and 8 lbs. of white clover per acre.* But it more often is the case that there are numerous trees and other objects on an old place that prevent this thorough treatment, and the cultivation of the land to the very doorsteps, for even one or two years, is not a very pleasant thing to contemplate; therefore some other method of renovation

* See Chapter III on Lawns.

must be resorted to. Under these conditions the surface must be graded by shaving off the projections as far as possible, raising up the turf and filling up under it where there are depressions, or grading over the uneven surface with good soil, so as to present an even and flowing outline. Then grass-seed of the same kind and at the same rate per acre as for the new lawn, i.e., 2 bu. red-top, 2 bu. June-grass, and 8 lbs. of white clover (the poorer the soil the more seed should be used), should be sown, raked in with a liberal dressing of fine manure, or fertilizer made as follows: 1500 lbs. of fine-ground bone, 300 lbs. of muriate of potash, and 200 lbs. of nitrate of soda or sulphate of ammonia, per acre. Treated in this way, if an abundance of water is used and if the grass is frequently cut during the summer, a good lawn may be obtained in one or two years.

For new seeding the potash and nitrate of soda should be thoroughly worked in with the soil some time before the seed is sown.

The specially prepared lawn-dressings are equally good in place of the above fertilizers, but more expensive.

Smoothing Abrupt Slopes and Embankments

As far as possible all abrupt slopes and embankments should be graded down into well-rounded and graceful outlines. Such grades are much more beautiful than abrupt terraces or slopes, more easily cared for, and there is no danger from injury by the turf sliding down or being broken down by stepping upon it in the spring as the frost is working out of the ground.

It is often possible to remove unsightly bank walls and grade over the place with graceful rounded outlines that are more natural and beautiful, and wherever possible this should be done. By excavating in front of the bank wall,

as in Fig. 63, a space may be obtained in which to cover up the stones if they are needed for no other purpose, when the surface may be sloped off at line *BB*.

In some cases, however, where the house is located on a very steep slope and very near the street, a retaining-wall becomes a necessity, under which condition the only way that the unnaturalness of the surface can be hidden is by covering the wall with climbing vines like the Japanese woodbine (*Ampelopsis Vietchii*), Fig. 147, page 257, or by

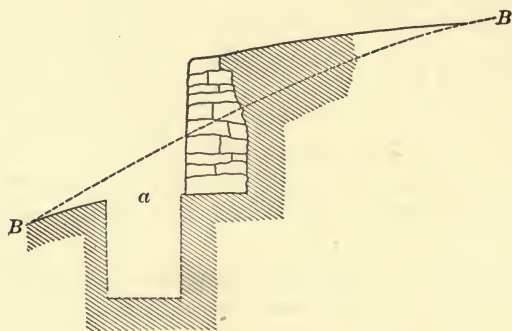


FIG. 63.—Covering Bank Walls.

planting a row or border of shrubs, like Japanese barberry, or small evergreen trees in front of the wall. Evergreen trees and shrubs succeed best on a cool northern exposure unless too much exposed to cold winds.

Deep ditches and basins that cannot be easily graded over with material at hand often serve as a place for dumping rocks and other materials that may be gathered about the place or along the roadside, thus working great improvement in two directions. The small stones also will serve as the best kind of foundation for the walks and drives, while the good soil removed from the walk or road-bed will serve

for grading or dressing over the uneven surfaces in other parts of the grounds or by the roadside.

Removal of Fences

All fences are objectionable in view of their unnaturalness, lack of beauty, the expense of building and keeping in repair, and wherever they can be dispensed with it is economy to remove them.

Except in the village lot, where footpaths are likely to be formed by constant crossing, there is no good reason why fences may not be wholly dispensed with. It is sometimes

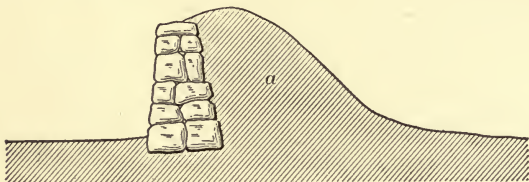


FIG. 64.—Turfig against Bank Wall.

the case in the country that cattle must be driven along the roadway every day to and from pasture, when a fence may be needed, but where there is only small chance of injury it is better to suffer the lesser of two evils. A stone wall may often be covered from view by a bank of soil against it, as in Fig. 64.

Whatever fence is maintained should be as simple and inconspicuous as possible.

Improperly Located Buildings

The greatest source of difficulty in improving established home grounds is often found in improperly located buildings. We can easily dig up here and there a tree or prune them to

good form and transplant shrubs and herbaceous plants with little cost, but to relocate buildings often entails great expense. One of the greatest mistakes made in locating buildings is in placing them too near the street and too closely together.

The main buildings can seldom be moved or changed without considerable cost, but the relocation of small buildings can often be easily made.

If possible, all the buildings should be located some distance from the street and far enough from the boundary-line to allow of some decorative trees and shrubs on every side of them, to serve as a setting for the central part of the home-picture, the house.

In case the buildings are nearly or quite on the line all the view to be obtained must be dependent upon that provided or allowed by neighbors, and the only thing that can be done to improve the beauty of the buildings is to plant vines to grow upon the wall or upon a trellis very close up to it.

If possible, the outbuildings should be located in the rear of the dwelling, at some distance from it, and more or less screened from the latter and from outside view, unless they are more or less ornamental in character. The exposed view of a neat, comfortable stable is not objectionable, as it may be so arranged as to give the air of substantial comfort and extent to the grounds not to be found where only the house is in view.

Improperly Located Walks and Drives

Another frequent fault to be found on an old place is improperly located walks and drives.

The proper location of these necessities of comfort is of the greatest importance, and the reader is referred to Chapter VI, where the matter is more fully discussed.

It must be borne in mind in the construction of roads and walks, under all circumstances, that a good road cannot be made, no matter what the material used, *unless the road-bed is thoroughly underdrained*, and the surface of the road or walk must have more or less curve or slope toward the sides to carry off the surface-water. The finer and poorer the material used, the greater this curve must be.

Wherever it is possible one or more lines of tile should be placed under the road-bed, at least three feet deep, with a good fall and free outlet for drainage.

The extent of the walks and drives should be limited to the *actual* needs of the place. The fewer the gravelled walks or roads the better; yet a place without at least a walk up to the front door, or a smooth drive to the stable, would look inhospitable or almost uninhabited.

While there is no beauty in walks and drives in themselves, yet if they are well laid out in graceful curves just where they are needed, and well cared for, the variety they afford and the air of comfort and the inviting hospitality they give to a place make them very important factors in all home landscape work.

In many cases the relocation of walks and drives is simply a matter of ploughing up the old one, grading a little and relocating, as a majority of these walks are made on the surface of the ground without previous subsoil preparation. If, however, a road-bed has been formed by excavation and filling in with stones, the work will be more expensive.

In relocating, the rules given in Chapter VI for the establishment of new roads and walks will be equally applicable.

An already established place that needs improving may be likened to an unfinished picture the details of which must be filled out and retouched and any defects covered up, while in the new place we have but the canvas—the colors and other material are all new and fresh, i.e., the

land, the rocks, water, buildings, grass, trees, shrubs, etc. The result in the first case depends largely upon how much and how good is the work that has been done, and how skilful the artist in adapting himself to the ideas already started, and in remedying defects. In the second case the results largely depend on the artist alone.

Farm-home Decoration

The decoration of farm homes is a subject not often discussed in works on landscape gardening, but there is no place so susceptible of ornamentation as the average farm, and possibly no place where so little is done to improve the beauty of the home surroundings. Generally there is an abundance and a great variety of land, also a wealth of materials in the way of trees, shrubs, and plants that may be used, and the tools, teams, and labor with which to bring about the ornamental results. Fig. 65.

Most Home Owners Attempt to Cultivate too Much Land

Most of our farmers and home makers have too much land, and they would in many cases grow rich faster if they cultivated less land and planted the less productive places, the odd bits, the rough stony fields and abrupt slopes, the small irregular lots in the angles formed by roads or fence lines, with trees that would be a source of beauty and in time add value to the property. Such decoration would be a source of pleasure to those doing the work and to all of the occupants of the home, and the pleasant associations and memories of the farm home, where beauty and utility are thus combined, will do much to make home the dearest of all places, and especially prevent the young men from leaving the farm for city life.

The rules for planting, arrangement, and care of trees and shrubs to be followed in this work are given in previous chapters. Many unsightly objects can be easily hidden from view, and the more beautiful features in the picture



FIG. 65.—A Well-decorated Farm Home.

from the dwelling be brought out more prominently and improved.

Windbreaks for the house and other buildings may be easily provided, as well as shelter for the stock in the pasture against the fierce storms of spring and autumn and the burning sun of the summer.

A few majestic oaks, chestnuts, or other spreading trees

in the pasture, or here and there dotted about the farm or near the buildings, add much to the beauty and character of the farm landscape, and every effort possible should be made to encourage the growth of such and preserve any that may be already established.

Fruit-trees as Ornaments

Fruit-trees on suitable land in many cases may be used in work of decoration on the farm, thus serving a double purpose. The apple, pear, and plum require a strong, well-enriched soil and an avenue of them just inside the road boundary, bordering large mowing lot or farm roadways, if properly cared for so as to make well-formed heads, would be a source of great beauty when in blossom, and again when loaded with fruit in the autumn. The cherry and peach require a lighter soil with a full exposure of air, as on the brow of a hill or a western or northwestern exposure, and nothing is more beautiful than an avenue of pyramidal cherry-trees when in bloom early in the spring, while the beauty of the peach blossom and its ripening fruit have not been too highly praised in song and story.

The labor and expense required to produce the few touches of beauty on many of our farms to make them homes of comfort and beauty are very small, and the skill and taste acquired in this work will enable one to become more skilful in other directions, i.e., in growing and preparing many of the profitable crops for market.

It is generally conceded that the most successful and thrifty farmers are those who have a love for the beautiful, who keep their premises in a neat condition, who have every tool kept in its proper place when not in use, and who never allow anything to be out of place longer than is necessary. No waste, no leaks are allowed, and if weeds or

brush interfere with their growing crops, or with ornamental or fruit trees, they are despatched. Love of order prevails everywhere, about the barn, by the roadside, as well as about the home-buildings, and beauty and thrift go hand in hand.

We are largely creatures of habit of thought or of labor, and anything done thoroughly, systematically, beautifully in one direction helps us more or less in all other lines of work.

Farm-roads

Good farm-roads are a necessity for quick and easy transportation of the products of the farm. The principles of construction of such are the same as for other roads,* and where there is an abundance of stones they may be utilized for foundation and unsightly objects removed from the surface of the land or roadside.

Road-making is very expensive business, and few farmers find profit enough in their work to warrant the expense of long lines of roadway. Only such roads as are absolutely needed should be made, and the expense of construction will be felt less if only a short length is constructed at one time. Whenever stones are being picked up from the land, a convenient way of getting rid of them is to excavate a piece of roadway and cover with a dressing of gravel on top. This is far better than dumping them along the roadsides or in some other equally conspicuous place, where brush and weeds will grow up through and about them in such a manner that they cannot be eradicated except by finally removing the stones and tearing them out root and branch.

* See Chapter VIII, on Roads and Roadside Improvements.

Removal of Stone Walls and Fences

Except around permanent pastures and to protect fruit and other plantations from trespass, walls and fences are no longer a necessity. The ordinary fence is not ornamental no matter how nicely made, and is very costly to construct and keep in repair. They occupy a great amount of land, and the average stone or wood farm-fence gives harbor to mice, squirrels, and other vermin. It is also almost impossible to keep weeds and brush from getting such a foothold along their line as not to be easily dislodged, and ornamental trees and shrubs are much more subject to insect and fungous pests, making it very difficult to grow them successfully where such harbors for these pests exist. If one is located near a large and growing town or city, stone walls can be disposed of for building purposes, and the "stone crop" of many farms often becomes a large source of income.

Pond-holes and boggy meadows may be filled up with the accumulating small stones, covered over with soil, and thus land of some value be produced, while the stones are put where they will never cause further trouble.

CHAPTER VIII

COUNTRY ROADS AND ROADSIDE IMPROVEMENTS

It is often said that the condition of the roads in any community is an "index of the intelligence of its people"; and while this may not be wholly true, the roads are an index of their thrift and prosperity, for without good roads frequent and easy communication cannot be had, farm crops and manufactured products cannot be taken to market at the same cost on poor as on good roads, because of increased time required for transportation, and the greater wear and tear of horses and carriages. Then there is little pleasure or comfort in riding over muddy, rough, and unkept roads.

In many sections the amount of money appropriated for the construction and repair of roads is sufficient to keep them in good condition, but this money is often expended with such poor judgment as to leave a large part of the roads practically uncared for. The work, too, is often let out to parties who know nothing of the principles of road-making, or whose greatest care is to make as much profit from the work as possible.

The Conditions Necessary for a Good Road

To construct a good road three things are necessary, viz., (1) *well-underdrained soil*, (2) *a good foundation*, and (3) *good road material* for the surface.

1. In ordinary road-making very little attention is given even to surface-draining, much less to underdraining,

yet nothing would improve our roads at so small a cost as tile or stone drains under the road-bed: and no matter how good the surface material, a perfect road cannot be made without perfect drainage. If the land is very wet and full of springs, a line of tile on *both sides* of the road-bed, not less than $3\frac{1}{2}$ feet below the surface, may be needed. See Figs. 57 and 58. If the road is on a slope, the tile should be placed a little above the upper gutter to cut off all water that would flow to the surface.

2. A layer of stones from six inches to one foot in thickness placed at a depth of two or three feet below the level of the road and well packed in at the bottom, provides good drainage for a time and makes a very solid foundation upon which to place smaller stones and a top layer of gravel six to eight inches deep. But for ordinary road-making this foundation will not be required if the surface-drainage and underdrainage are well attended to.

3. Good materials for road-making are often difficult to obtain without considerable expense, but with the good foundation resulting from thorough drainage fairly good roads are sometimes made with poor surface material.

Broken-stone Roads

The best material for a permanent road is undoubtedly broken stone, and it will generally be found the cheapest in the end; and next to this is clean sharp gravel with more or less small stones intermixed. To make the broken-stone road requires the investment of considerable capital in stone-crushers and heavy steam-rollers, which is beyond the means of small towns.

The assistance now being offered by many States to suburban districts in the construction of State roads made on the most approved principles will lead to rapid progress

in correct ideas of road-making; and the large number of automobiles and bicycles now in use will furnish another incentive to further improvement.

In this volume no attempt will be made to give detailed instructions for the construction of broken-stone roads (Fig. 67), but the discussion will be confined to the making and improving of ordinary gravel roads.

Surface of the Road

The most noticeable feature of the ordinary country road is its *flatness* and unevenness of surface and the little attention given to surface outline and underdrainage, both of



FIG. 66.—Section of Ordinary Country Road.

which defects can be easily remedied. A section of the ordinary road, as often seen, is shown in Fig. 66, where the shoulders are higher than the road-bed and with depressions or basins here and there, caused by settling from the weight

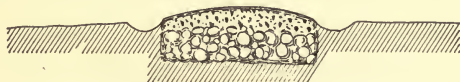


FIG. 67.—Section of Macadam Road.

of traffic or from the displacement by frost. Such a road will wear out rapidly where the water stands, will be unpleasant to drive over on account of uneven surface and mud, and the worn particles of the road will not be washed out to the side, but become fine dust during dry weather. Fig. 67 illustrates the modern macadam road with well-rounded surface and gutters; but whether the road be constructed

of broken stone or not, the rounded surface and gutters are a necessity for a good road.

The surface of the road must be given more or less crowning, according to the material used. The poorer or more loamy the material the more must it be crowned or rounded.

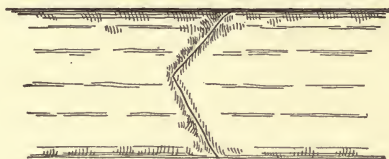


FIG. 68.—A Properly Constructed Bar.

The shoulders made by the settling of the centre of the road, and by growth of grass and washing of the fine particles from the centre, should be removed *whenever they are so high as to interfere* with the quick passage of the surface-water to the side gutters. Gutters or ditches must be provided along the roadsides to prevent surface-water from washing

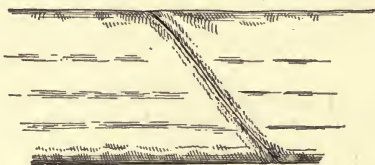


FIG. 69.—An Improperly Constructed Bar.

up on the road surface and to catch and carry off quickly the wash from the road. These ditches must have frequent outlets and be without basins in which the water will stand.

On hillsides frequent light bars should be made, and be kept in such condition at all times that no water will run over them into the middle of the road. They should start from the middle of the road and run diagonally to each side (Fig. 68) and

not diagonally across the whole road. If made as in the first case both wheels will strike the bar at once and no side jolt will be felt, while if constructed as in the second case a very unpleasant side jolt is produced and carriages are often seriously wrenched. When the auto is used these bars must be made more solid and shallow than where carriages are used. On the upper side of a side-hill road good and frequently cleared gutters are needed to prevent washing, and also frequent culverts to carry the water across to the lower side; for if the water runs over the roadside and a long distance in the middle of the road, it often gains such momentum as to do a great amount of damage during heavy rains.

Width of Road-bed

The width of the road-bed as constructed by our road-makers is very variable, some making them from 15 to 20 feet, while others would make them only from 8 to 10 feet wide for the same amount of traffic. On most main roads between large towns and cities the width need not be over 15 feet, or only wide enough for two teams to pass readily, with rounded, sloping, well-turfed sides which will not be injured by an occasional turning out upon them, and crowning sufficiently to allow the surface-water to pass off quickly.

In less thickly settled districts a single width of road-bed, i.e., from 8 to 10 feet wide, will be as much as is needed, and will be much less expensive in construction and repairs than if made wider.

Repairing Roads

One of the greatest mistakes made in repairing roads is in using poor material for dressing them over, when good material may be obtained at only a little additional cost.

The best gravel that is to be had within reasonable distance will generally be found the cheapest in the end.

A great mistake is often made also in spreading the repair material evenly over the whole road surface, as in Fig. 70, when one-half of the material placed in the centre with the shoulders of the road removed, as in Fig. 71, would give far better results. If the material is put on flat, the road-bed will remain flat, or grow more and more depressed in the middle, and none of the fine-worn material can pass

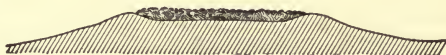


FIG. 70.—An Improperly Gravelled Road.

off, but remains to make mud and dust; while if well rounded in the centre it will retain its form for some time, the fine-worn material or dust will be washed to the outside of the road, and less trouble will be experienced with mud and dust.

The gravel placed in the center of the road will work to the outside as fast as it is needed to keep the form of the



FIG. 71.—A Properly Gravelled Road.

road-bed, and there is scarcely ever any good reason for spreading it more than from 6 to 8 feet wide in a road-bed of a single width, or 12 to 14 feet in a double-track road.

As far as possible when dressing over a road the coarser material should be kept spread or raked forward as each succeeding load is added and well covered with the finer material.

Road-repairing should be done in the spring before the

ground has become fully settled that the repair material may settle into the soft soil.

If the shoulders (*a*, Fig. 71) of the road are kept worked off by the road-scraper or plough, and a thin coating of gravel be put on in the centre each season, any ordinarily well under-drained road can be kept in good repair at a very small cost.

Road-scrapers when properly used are great labor-savers, and in sections where ordinary soil must be used—and there are many such—they save a great amount of labor and expense. Where the unworn material on the edges can be used to advantage, or for the purpose of breaking off the shoulders, the rounding of the surface of the road in the spring, the road-scraper will do the work quickly and thoroughly, but to use it during the summer for any other purpose than for scraping off the worn material will result in more harm than good.

The practice of turnpiking or scraping poor material, like turf and loam, into the middle of the road during the summer will largely account for the poor condition of many of our roads.

All turf turned up by the road-scraper or plough should be removed from the road-bed entirely and used for filling in over steep enbankments, deep gutters, or in levelling up and otherwise improving the roadside.

Roadside Improvement

In the rush and hurry to gain wealth or fame we Americans often forget everything but our immediate surroundings, and our roadsides, even in the vicinity of many well-kept residences, are in a state of utter neglect—not only this, but the roadsides are made a dumping-place for rubbish of all sorts.

It would require but little time or expense to put the

roadsides in our towns and villages into a state of great beauty and neatness if all would work together in the right way. Perhaps the first and most important consideration in roadside improvement is that all shall refrain from dumping rubbish of any kind along the roadside, and the highway surveyor or road commissioner or agent should first set the example, and whenever trees are trimmed up or brush is cut along the roadside, or stones picked up or dug out of the road-bed, that all shall be *removed entirely from within the road boundaries*. All accumulations of stone or other rubbish should be removed, so that desirable trees may be improved and undesirable trees, shrubs, or weeds, can be easily eradicated.

The expense of this work need not be very great, for almost everywhere there may be found pond-holes, ditches, ravines, etc., where such materials may be dumped and covered up. The next important matter is the smoothing and evening up of the surface of the roadside. Here again those in charge of the repairs of the roads should take the initiative, and all turf and loamy soil not suitable to be put on the road-surface should be used for smoothing up and making gracefully curved or sloping roadsides.

Preserve Native Trees and Shrubs

The native trees and shrubs should next have consideration. No country possesses so many beautiful woody plants as the United States; they are generally found growing where they thrive best, and any desirable kinds found growing by the roadside that can be made to produce a proper form of growth should be preserved and improved.

The laws passed by some of our States for the protection of shade-trees, whereby it is made the privilege (it should be the "duty") of the town or city authorities to mark

such trees and shrubs as it is desirable to have preserved, and making it a criminal offence to destroy those thus



FIG. 72.—Roadside Decoration at Entrance. (Burpee.)

marked, are steps in the right direction, and should be adopted in every State.

There is nothing which adds so much to the comfort of the travelling public as well-shaded streets, and a comparatively short time is required for our most rapidly growing trees to reach the size to afford considerable shade; but, whether we live to enjoy or see others enjoy their beauty and shade or not, we are certain that if properly planted in suitable soil more than one generation will be benefited by them. If every landowner would trim up and care for a few trees found growing by his roadside, or plant a few each year where none are now growing, it would be but a short time before our country would be noted for the beauty of its roadways, as well as for the general comfort and beauty of the homes of its common people.

Trees found growing by our roadsides will often be of many varieties and will seldom be in such exact lines as if planted, but often more real beauty will be the result of this variety and irregularity of line and spacing. In many cases very beautiful results will be obtained by this irregular arrangement; at many points along a roadway interesting views of extended landscapes or glimpses of water are brought to view that would be hidden if the line of trees was unbroken. Fig. 73 shows a beautiful roadside picture.

Along almost every country road may be found young trees that have sprung up from seed planted by nature in the shelter of the stone wall or fence and hedge-rows. These trees are generally well rooted, and if allowed to grow and are given proper care as to pruning and protection while young they will make better formed, more hardy and long-lived trees than those grown in the nurseries. Should the trees have been injured by growing too closely, their form may be remedied as described in Chapter VII on "Renovating Old Places."

Fruit-trees along Roadways

As a matter of economy fruit-trees along the roadsides are advisable, for they generally grow with great luxuriance with little care, produce large crops of fruit, and, in a measure, serve the purpose of ornamentation, but they do not give the desired shade, such as is produced by the elm, maple, oak, and other tall-growing ornamental trees, and which is one of the main objects of roadside tree-planting.

Planting Avenues

In almost every section of our country we find beautiful avenues of shade-trees along the roadsides which have been planted by public-spirited citizens, and such avenues are grander monuments to their memory than stone or marble; but the amount of roadway thus decorated is very small as compared with that which is bare and possessed of little or no beauty. Village improvement societies, Arbor-day planting, planting-bees, etc., are doing much to encourage and increase the good work. The expense of the trees is very small, and it requires but an hour or two to obtain and plant a tree, and every landowner will find a few hours spent each year in thus adding to the beauty of his surroundings often the most profitable hours of his life, adding to the value of his property and building a monument that shall stand long after his face has been forgotten.

Ornamental Shrubs and Flowering Plants along the Roadsides

The great variety of ornamental shrubs, vines, and plants that we find growing along our country roads,

even when growing in neglect, are often very beautiful features, and with a little care might be made to give as

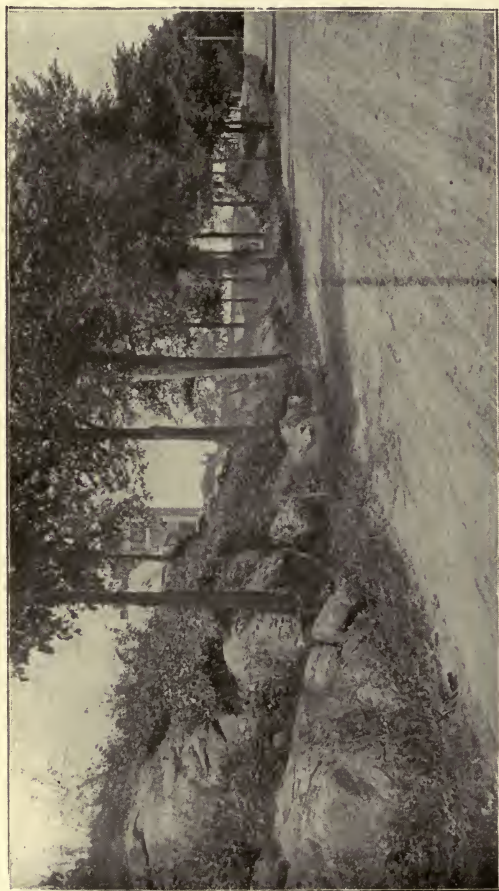


FIG. 73.—A Roadside Picture.
(Copied from Bulletin No. 46, N. H. Agricultural College Experiment Station.)

beautiful results as are often obtained by planting on the lawn.

The planting of exotic or imported species under such conditions seems not in good taste and cannot be recommended.



FIG. 74.—A Roadside Picture. Natural growth well cared for.

Grass alone under roadside trees and shrubs unless well trimmed is not a very ornamental feature, but is necessary to a perfect finish and setting of the trees and shrubs.

If the land is smooth and free from stones and can be ploughed through to the roadway, the surface can be very easily graded up and finished around the ornamental planting, but generally the smoothing and levelling must be done by the slow process of digging off the projections and filling up the depressions.

The same smoothness that we find on the lawn is not to be expected or desired, but there should always be a well-rounded gutter between the road-bed and the border.

As with trees, we find also a great many shrubs, ferns, and flowering plants already established along the roadsides, and but little care is needed to put them in condition of perfect growth. Shrubs can be more severely pruned and more quickly grown into perfect shape than trees.

This work, however, should not be left to the irresponsible road commissioner or agent, but should be in the hands of the village improvement society or some one who can be depended upon to trim out only the undesirable varieties and preserve such as are the most ornamental and of the best form.

Should the soil be very poor, a light dressing of compost or fertilizer should be used, but generally the road-wash can be so utilized as to make the best of top-dressing and produce the most perfect growth.

If we take the ornamental trees, shrubs, vines, etc., as we find them along our roadsides, we are pretty sure that the soil in which they are found is well suited to their growth, but if we transplant to fill up places not properly provided we must be sure to set out such as are suited to the soil and exposure of the place. Some species will only do well under conditions of a close tangled growth and such conditions must be provided for them, while those that only reach perfection in full exposure on all sides should be planted accordingly.

The custom in many sections of our country of regarding everything growing along the roadsides as common property will need some reform before roadside decoration can be carried out to its fullest extent, but the process of education is going on in our public parks and squares, in cemeteries and school-yards, and there has been a great improvement in the respect that our people have for public decoration, they realizing more and more the great benefit such work is to the community.

Removal of Walls and Fences

The removal of walls and fences wherever not needed to keep stock in the pastures will do more than anything else to help on the cause of roadside improvement. Stone walls and other fences are not needed except under the conditions mentioned on a previous page. They are a great source of expense to build and keep in repair, and in many sections of the country are being removed from the roadsides and along cultivated fields. Where the land is valuable, this is an important item, as considerable areas are made available for cultivation, besides greatly improving the roadsides and reducing the number of insects and vermin that neglected roadsides harbor. If a fence is decided to be necessary along the roadway or near dwellings it should be made as inconspicuous as possible. A woven-wire fence on gas-pipe or steel posts painted green will be the least conspicuous from all points of view and in the end not more expensive.

CHAPTER IX

PARKS, PUBLIC SQUARES, SCHOOL-YARDS, ETC.

THE limits of this work will allow of very little discussion of the above lines of ornamental landscape-work, but it is a subject that is attracting so much attention and so much progress is being made in this kind of work that some of the principles involved will be briefly touched upon.

Nearly all of the parks connected with large towns and cities are under the direction and management of skilled engineers and landscape artists, and little that can be presented within the limits of this volume will be of value to them, but in many towns and cities we find so much imperfect work, and so much of a tendency to attempt more than the available funds will warrant or more than the managers can master, that we cannot but offer the suggestion that if less were attempted and the more natural features were developed and improved instead of trying to ape the larger parks which are far beyond them, there would be less of the shoddy work done and more that is really artistic and beautiful because of its perfect naturalness.

The well-kept village green with a good lawn and a few large well-grown trees in perfect condition and with no fence around it is a thing of real beauty easily and cheaply cared for, far exceeding many squares or small parks fenced in with expensive iron or wooden fences, entirely unnecessary for any purpose whatever, or elaborate fountains, and attempts at statuary.

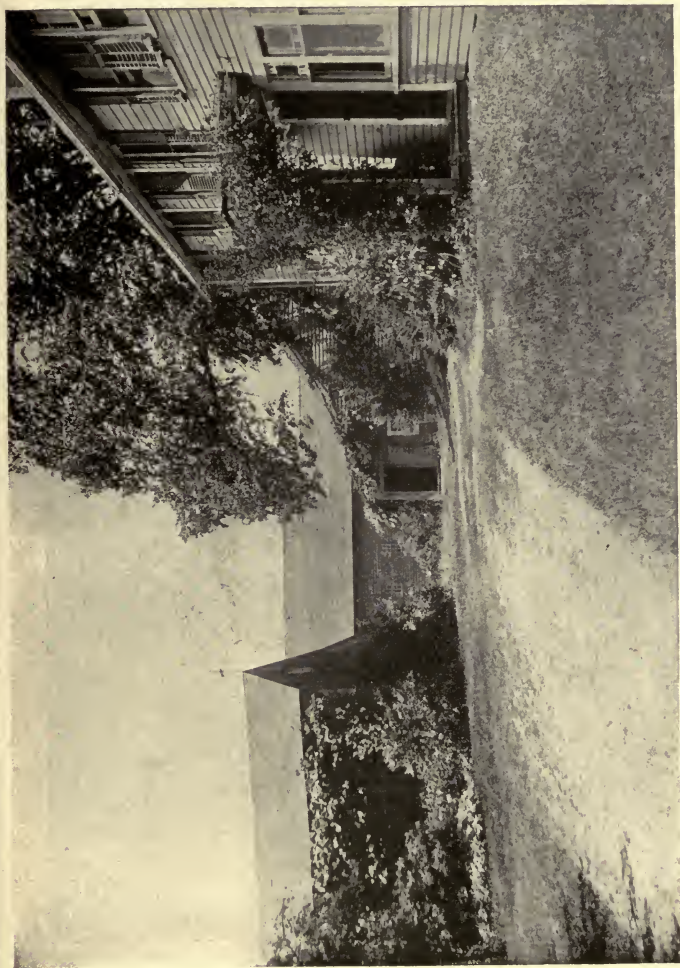


FIG. 75.—Backyard Decoration.



FIG. 76.—Decorated Well Curb.

When the natural features of any park, square, common, or village green have been made as perfect as possible, and all made to blend and harmonize with the surroundings, then it is time enough to think of adding artificial objects. Let every tree, shrub, vine, or plant be made as perfect as possible. Let every rock or ledge too large to be easily removed be decorated with suitable natural growth of shrubs, vines, and plants. Let any body of water, stream or brooklet, be carefully and neatly decorated, and there is hardly a park, square, or green that will not be beautiful, that will not possess merit that will please any one with true artistic taste.

No work of decoration however small should be undertaken unless it can be done well, for half work is often worse than no work at all. No community need go to a great expense for plans or advice upon the subject of ornamenting public grounds, for there are many skilful men connected with the park systems of neighboring cities who will be glad to help on the cause of the ornamentation of public grounds. There are also men of skill and experience connected with the colleges and experiment stations of each State to whom they can go for advice, and our agricultural and horticultural press abounds in illustrations and suggestions for such work. What is most needed is some patriotic and energetic person or persons with a real love of nature and the beautiful who will take the lead and work unceasingly until success is attained. Such individuals are to be found in almost every community, and their efforts should be seconded and supported by substantial aid. The old-time "planting-bees" should be revived, or the substitute for this, Arbor-day, when the planting of public grounds by the united effort of every one who can give a few hours to the good work, would soon result in beautifying all of our public squares, village commons, and roadways.

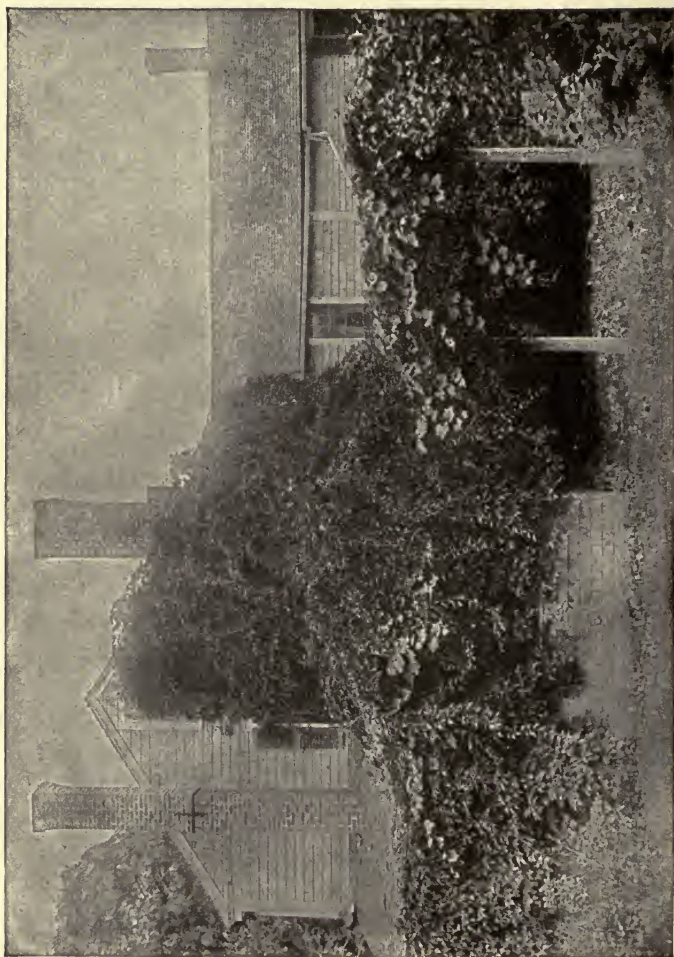


FIG. 77.—Decorated Back Porch.

Back-yard Decoration

The "back yards" of most homes may be decorated so as to present many pleasing pictures. Trees, vines, shrubs and grass may be made to grow with great vigor if properly fed, and most back yards naturally receive much plant food material from the wood pile, the ash pile and other materials



FIG. 78.—Combined Useful and Ornamental. Grape Vine above Golden Glow below.

scattered about the woodshed, the stable doors and other outbuildings. Where poultry is kept the soil is often too rich in nitrogenous matter and may need improving by the addition of potash and phosphate that may be obtained from wood ashes or from chemical fertilizers. Fig. 76 shows the decoration of a "well curb" which may be used either in front or back of the house. Fig. 75 shows a variety of shrubs used to cover the lower part of old buildings.



FIG. 79.—Combined Useful and Ornamental. Part of Fig. 78.

Vines occupy little ground space, and the over-supply of plant food in the soil will cause a very vigorous growth. Where there is but little passing over the walks, turf may be made hard and fine by frequent cutting and rolling and is much more comfortable and easy to walk upon than concrete, cement, gravel, etc. The grass walk is much more easily cared for and more beautiful.

School-yard Decoration

Much has been written in the past few years on the subject of the decoration of our public-school yards or playgrounds, and some progress has been made in teaching the average village schoolboy that there are some things about our school buildings and grounds that he ought to respect. Very little, however, can be done in this direction until the pupils come to see and understand the effect of beautiful surroundings and acquire something of a love for neatness and beauty, both inside of the school-house and on the play-grounds.

This may be accomplished in a measure if nature-studies are taught to our younger pupils in the public schools, or better still if at home they learn something of the beauty and wonders of the natural world about them, and of the necessity of some effort and restraint on their part in obtaining and preserving the things of comfort and beauty that they are permitted to use.

One of the first conditions or requirements of successful decoration of school-yards is an abundance of land. The quarter or half acre upon which school buildings are usually located is by far too small to provide space for large numbers of children to play football, baseball, and other vigorous games and have any space for decoration, and it is useless to attempt anything more than the planting of a few large



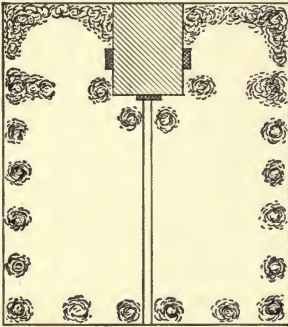
FIG. 80.—A Substantial Village School-house with an Abundance of Light and a Good Arrangement of Trees and Shrubs.

trees upon such grounds that will withstand the attack of the crowd in their rush or run for the goal. On larger grounds where a liberal space can be assigned for the play-ground decoration of greater or less extent with smaller trees, shrubs, or plants may be attempted at points some distance from the play-ground and in the angles where there is no necessity or excuse for the pupils crossing the grounds.

It is always advisable to have the play-grounds and the sanitary accommodation of the boys and girls separated, especially in graded schools of the older pupils, which necessitates a larger area of land and more extensive decoration, and for a school of from 100 to 200 pupils not less than 1 to 2 acres will provide adequate space. This large extent of land is often difficult to obtain, but it will be found one of the best investments that can be made for our school-children, especially in thickly settled villages, and where the buildings are located near stores, railroad stations, etc. If the sanitariums are placed in the basement of the school-building, as they should be and are in most modern buildings, and the grounds are where they command full view from school doors or windows, the play-grounds need not be separated more than by an occasional group of small shrubs to distinctly mark the boundaries.

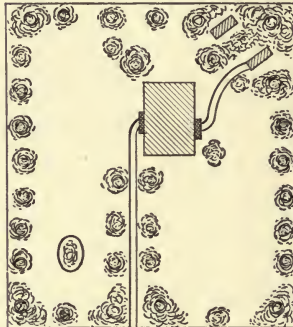
Reading-rooms, gymnasias, and other sources of entertainment and instruction provided for the pupils of our public schools will be found to aid greatly in the moral, physical, and intellectual training of our youth. Neatness and comfort should prevail everywhere, that each pupil may feel encouraged in every effort at self-control and good purposes. Figs. 81, 82, and 83 illustrate how school-yards of various forms may be divided into two separate yards and the arrangement of the trees and shrubbery. The arrangement of shade-trees around the border is a desirable feature, whatever the size or form of the grounds, and if trees of

large size are properly planted they will not be often injured unless it is done wantonly, and with very little care are sure



Street

FIG. 81.



Street

FIG. 82.

FIGS. 81-82.—Arrangement of School-yards.

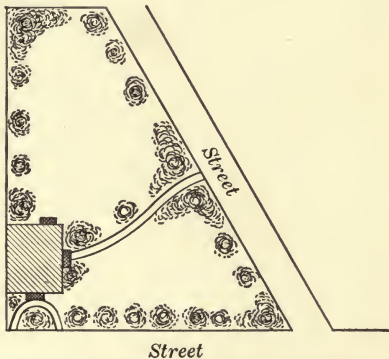


FIG. 83.—Arrangement of School-yards.

to give very satisfactory results. If the pupils can be interested in the work of decoration by the observance of

Arbor Day and field days, there will be little or no difficulty in keeping the sentiment of the school up where care will be taken that no injury is done to the ornamental material planted.

If all the pupils of a school can be encouraged to take up the study of the science of botany, and beds or plots of ground provided for the germination of seeds or growing of interesting plants, it will be a source of instruction and pleasure and lead often to more extended decoration; but where only one class takes up the work, the feeling of class jealousy is often such that work of this kind is not safe from molestation.

As in tree-planting by the roadside or on the lawn, the mistake is very often made of planting too closely for full and perfect growth. They should not be planted so close to the building as to shade the windows and cut off the light.

No nuisance or objectionable views should be permitted near the school-house, and if distant views of beauty and interest can be preserved and unpleasant features shut out in the arrangement of the trees and shrubs, as they often can be, it should be done. The more beautiful and attractive features that can be brought together about our school-houses and grounds the more easily will the pupils be governed, and the greater will be their progress in everything that makes for good citizenship and upright, honorable lives.

Cemetery Decoration

The decoration of the resting-places of those loved ones who have gone before has always received much attention, and special grounds in every village and hamlet have been set aside sacred to this purpose.

In the earlier days of our country the space devoted to



FIG. 84.—A Modern Cemetery. Weeping-willow and Aquatic Plants.

this use was very limited and the geometrical style of ornamentation employed. The grounds, being enclosed by more or less pretentious fence and the trees and shrubs arranged in a stiff, formal manner, often presented the most gloomy and uninviting features possible, instead of that quiet beauty and rest that we love to think of as the most appropriate resting-place for the bodies of our loved ones.

Within the past twenty-five or thirty years, however, great progress has been made in beautifying these grounds, and to-day we have some of the most beautiful examples of natural landscape or ornamental gardening connected with our park cemeteries to be found anywhere in the world.

In the selection of the location for cemeteries naturally beautiful grounds, with more or less seclusion and quiet, away from the hurry and bustle of the village or city, and with a dry, rather light, porous soil, are most desirable.

The more natural features of beauty that can be found the more easily and cheaply beautiful and finished work can be done.

All such natural features should be preserved as far as possible, and no attempt be made to bring naturally rounded slope to the level. In case of very abrupt embankments some grading down must be done, but often by introducing large rocks and boulders into the face of the embankment the appearance of naturally projecting ledges or boulders may be produced, that will be far more beautiful than any rounded slope can possibly be made.

In most cemeteries the main source of income is from the sale of lots, and the great danger to be feared is that, in the desire to secure a large number of lots, the ornamental features will suffer, and too many lots with regular sides or too many geometrical walks will be produced.

Economy of space may perhaps be obtained by the arrangement of the ground into squares, but the lots with

curved borders are susceptible of greater beauty in ornamentation. There is much greater ease and comfort in getting around by means of gracefully curved walks, and by the blending of all of the ornamentation into one system and under one management that the whole may be made to reach much greater beauty than if each lot were ornamented separately. The care and ornamentation of cemeteries should be under one management, and with authority vested by the condition of the sale of the lots to compel each owner to keep his lot in a neat and orderly condition, or to have it done at his expense by the managers.

All the planting must be done within certain limits and rules be made and carried out that no one shall plant any tree, shrub, or vine that shall in any way mar the beauty of the whole.

Under the conditions of a great variety of soil and a large number of people of different ideas of the beauty of the many kinds of trees and other plants that can be used with success in cemeteries, there is much danger of unsuitable trees being planted, and the superintendent must be a man of large experience as to what will give the best satisfaction under varying conditions and who has tact for dealing with the patrons of the grounds.

A boundary fence is often necessary, but not so often as is generally supposed, for almost everywhere, except in the extreme country districts, animals are obliged by law to be kept within proper enclosure, and when driven along the roadway to be kept as far as possible within the road limits, and the grounds can be made more beautiful if the fence is dispensed with altogether. If one must be put up let it be a simple gas-pipe, or steel posts and wire fence painted green. Near large cities, where more or less injury is done by irresponsible or vicious people, the fence becomes a necessary protection.

No fences, hedges around the lots, or other unnatural obstruction to the view of the whole grounds should be allowed, but in the arrangement of the general ornamental features secluded and quiet beauty should predominate.

The more distinctly graceful and ornamental trees and shrubs should be used in preference to the sturdy and grand trees, unless the extent of the grounds is very great, when the broad-spreading oak, chestnut, hemlock, and white pine may be used.

For directions for the care of the ornamental features of the cemetery, i.e., the lawn, walks, and drives, trees, shrubs, and plants, the reader is referred to the suggestions and rules laid down in Chapters III to VI.

An abundance of water is an absolute necessity for success in cemetery decoration, and service-pipes with faucets at frequent intervals should be provided if a supply of running water can be obtained, for the best growth of lawn, shrubs, or plants cannot be obtained, especially in time of drouth, without its frequent use. If the supply of water is sufficient, sprinklers should be kept playing on some part of the lawns all the time during extreme dry weather. The quiet lakelet, the rippling brook, and the fountain are features that are especially appropriate for cemetery decoration.

Renovating Old Cemeteries

Many of the old cemeteries of the country are of especial historic interest, as they often contain the only records to be found of much of our history, written on the tombstones found therein, and every effort should be made to save them from oblivion and make them interesting features of our surroundings.

Not having been laid out in any formal style with walks, drives, etc., most of the old cemeteries present very favorable

conditions for renovation to at least neatness and some show of quiet beauty. There are generally no boundary-stones to mark each lot, and the best and simplest way to produce beautiful results is to level down all mounds and projections



FIG. 85.—Typical City Street without Trees.

(From the Tree-planting Association of New York City.)

with sharp spades, fill up all depressions with good soil, and make the surface a smooth and green lawn. After levelling and smoothing up the surface a dressing of fine rich compost or fertilizer should be given and an abundance of fine

lawn grass-seed be sown and raked in. The headstones should then be placed in position, cleaning, repairing, and relettering such as are becoming obscure. The moss and lichens which indicate their age, however, should not be



Fig. 86.—A City Street well Decorated with Trees.

destroyed if it can be avoided. The trees, shrubs, and plants found growing in such cemeteries are often in a sad state of neglect and need much care and attention. They should be treated in accordance with the methods described

in Chapter VII on renovating old places, to which the reader is referred for suggestions. A few large spreading trees well cared for add much to the impressiveness of the scene, while large numbers of imperfectly grown specimens only invite neglect, and offer no attractions to those who wish to stroll about the resting-place of their ancestors or study the history of past generations.

Many of these old cemeteries are located in the very heart of thriving, hustling cities or villages, and while there are many sacred associations connected with the places, the noise and bustle of the town together with the inappropriateness of the location make it desirable and proper that they should be removed to other locations with more quiet and peaceful surroundings.

In this work every feature of the old grounds should be preserved as far as possible. The headstones should be set carefully in the same relative position in which they stood before being moved, and when so much is to be gained by removal no sensible person should object to what is a step in the direction of true honor and respect for our beloved dead.

Any place that is beautiful, quiet, and peaceful will have its influence on our hearts for good, and especially when in connection with so sacred a place, but the noisy street forbids any such influence, and the sooner these old cemeteries are moved to better surroundings and kept in proper condition the better, and the friends of the loved dead should rejoice that such conditions can be provided.

CHAPTER X

DESCRIPTION OF TREES

IN this and Chapters XI to XIV, inclusive, are given brief descriptions of the most valuable and beautiful trees, shrubs, and plants, and an effort will be made to point out in as few words as possible any peculiarities they possess or special treatment they may require for their most successful growth.

For convenience of reference they are arranged in the following groups:

Chapter X	{	Street- or avenue-trees.
		Upright or round-headed lawn-trees.
		Weeping trees.
		Trees with fine or cut foliage.
		Trees with colored foliage.
Chapter XI	{	Evergreen trees.
Chapter XII	{	Ornamental shrubs.
		Climbing vines.
	{	Hedge-plants.
Chapter XIII	{	Hardy herbaceous plants.
Chapter XIV	{	Ornamental grasses.
		Bedding-plants.
		Subtropical plants.
		Aquatic plants.
	{	Hardy ferns.



FIG. 87.—Avenue of Elms.

Street- or Avenue-trees *

Nothing adds so much to the beauty and comfort of our streets and roadways, especially in the summer, as well-grown trees on both sides, and we find many towns and cities throughout our country noted for the large number and beauty of their street-trees. City streets are difficult to decorate, yet by constant care trees may be made to grow as is shown in Fig. 86, while without the results are as in Fig. 85.

The following list includes those best suited for this purpose:

Elm, fringed-face form.	Ash, White.
Elm, American vase-shaped.	Oak, Red.
Elm, Slippery, fringed.	Oak, Scarlet.
Elm, European, urn-shaped.	Chestnut, American.
Maple, Sugar.	Hickory, White.
Maple, Silver.	Tulip-tree.
Walnut, Black.	Cucumber Magnolia.

American or White Elm (*Ulmus americana*), Fig. 88.

—This is unquestionably the finest street or avenue shade-

* The appended list of trees is offered by the Tree-planting Association of New York City as being the most suitable to select from for growth in that city:

Norway Maple.	Tulip Tree or Tulip Poplar.
Sugar Maple.	Balsam Poplar.
Silver Maple.	Lombardy Poplar.
	Carolina Poplar or Cottonwood.
American White Elm.	
Scotch Elm.	American Linden (or Basswood).
Pin Oak.	Lime (or European Linden).
Red Oak.	Nettle-tree (Hackberry).
American White Ash.	Oriental Plane-tree.
	Sweet Gum (or Liquidambar).
American Sweet Chestnut.	American Plane-tree (Buttonwood
Common Horse-chestnut.	or Sycamore).
Hardy Catalpa.	

If the *Ailanthus* is desired for planting, use only pistillate trees, as they give no unpleasant odor.

tree in the world. Its high arching branches spreading gracefully over the lawn, drive, walk, or roadway give an abundant shade, and yet a chance for air to circulate freely



FIG. 88.—A Perfect Elm.

under its branches. It varies greatly in form, from the broad round head, a perfect elm, Fig. 88, to the very upright and strict fringed vase form, Fig. 89, etc., all of

them, however, assuming more or less the graceful arching growth.

It grows to the greatest perfection in a deep, moist, alluvial soil and is very easily transplanted. It is often taken from the swamp or pasture and transplanted to the open lawn or roadside with success, though nursery-grown



FIG. 89.—Fringed Vase Form Am. Elm. (Green.)

trees if tall and clean with the branches 10 to 12 feet from the ground are more satisfactory.

It is rather difficult to know what special form a young tree may take, but the seeds from trees of specific form are likely to take the forms of their parents. When young trees are 3 to 4 inches in diameter we can judge, by careful study, pretty nearly what form they will take as they reach maturity.

In training a young tree a forked growth should be avoided,

Figs. 22 and 23, and a single leading shoot encouraged with lateral branches established at intervals on opposite sides of the main trunk, as in Fig. 20. If allowed to make the forked growth, they are certain sooner or later to be split down by the weight of snow or force of storms. This should receive especial attention with trees taken from the woods or



FIG. 90.—Sugar Maple. *A. saccharum*. (Green.)

roadsides, and cut back to the “bean-pole” condition, as is often practised, and all of the lateral shoots be kept headed back until the leader has full control, as in Fig. 20. To succeed in growing shrubs, bedding plants, bulbs, etc., under the branches or in the shade of a large elm, the soil should be dug out with a sharp spade, taking out all of the fine roots for a foot or more in depth and filling in with turfy soil. In case of a very dry season, apply water enough to wet

down below the soil filled in. This treatment must be repeated each season to be a continued success.

Slippery-elm (*Ulmus fulva*).—This species is of a broader



FIG. 91.—Silver Maple (*Acer saccharinum*). (Green.)

growth with larger leaves, but not quite the graceful form of the white elm, nor is it quite so large, but a valuable tree under some conditions.

European Elm (*Ulmus campestris*).—More upright and

compact than the American species, and valuable where a less spreading tree is desired. All of the elms are subject to the attack of the elm leaf-beetle, canker-worm, the elm-scale, and other insects, and need close attention to prevent their being seriously injured. See chapter on insects, page 261.

Sugar-maple (*Acer saccharum*), (Fig. 90).—Perhaps no tree is so largely planted for streets and roadways as this, and it has many valuable qualities. It is clean, upright, easily transplanted, and grows rapidly, but is somewhat subject to disease and the attack of the maple-tree borer, maple-louse, and other insects and fungous pests which have often destroyed large trees and broken into many a fine avenue of stately growth.

Silver Maple (*A. saccharinum*), Fig. 91.—This rapidly growing tree is being largely planted in many places. It is a clean tree of great beauty, and thus far has shown no tendency to disease or the attack of insects. The tendency it has of forming several main forked branches must be overcome by heading in *all but the central leading branch*, until the tree has become well established, as with the elms, shown in Fig. 26. This species thrives on all kinds of soil, but makes the best growth in a rather moist, deep soil.

White Ash (*Fraxinus americana*).—In growth this tree is very much like the sugar-maple with a little less of the conical form. The foliage is of a dark, rich color and free from insects and fungous pests. It is rather easily broken down by ice and wind-storms, and requires a heavy soil for its best development.

Red Oak (*Quercus rubra*).—Of the oaks this and the next species are the best for street decoration, but they can be used along narrow roadways by training only the branches high. This is best done by keeping the lower branches clipped in, as in Fig. 91a, and when strong main branches have been formed high enough to be above all danger

of striking passing teams the lateral ones may be cut away entirely.

Scarlet Oak (*Quercus coccinea*).—Somewhat like the red oak in habit of growth, but with thinner and more deeply-lobed leaves and producing more brilliant colors in autumn. The oaks are rather slow and heavy in growth, but when they become well established are especially

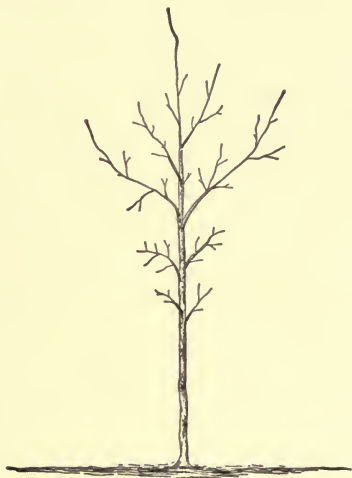


FIG. 91a.—Red Oak Pruned to Increase Height of Main Branches.

desirable on account of their long life, sturdiness, and strength. They are difficult to transplant and can be moved with certainty of success only by frequent transplanting in the nursery. To prepare an oak standing in the field or roadside for successful transplanting, a trench 10 inches to 1 foot wide must be dug about the tree from 2 to 4 feet from the trunk, according to size, and at least 2 feet deep. This trench should be filled with good soil to encourage the development of fine fibrous roots. In two years' time, if

the work has been well done, enough fibrous roots will be formed in this soil to render transplanting successful.

American Chestnut (*Castanea dentata*).—This tree grows to the greatest perfection in many sections of the United States, and in soils where the elm, maple, ash, and oak do not thrive. It is free from disease * and the attack of insects, rapid in growth, with a beautiful dark green foliage, and its abundant flowers in July make it an attractive feature of the landscape. Its fruit, too, is valuable and might be made a source of some profit if properly managed. Like the oak, it is difficult to transplant, and it has the same tendency to branch low when planted in full exposure, but these objections can be remedied in the same manner as with the oak, and its broad-spreading habit with proper treatment makes it a close rival of the American elm.

White Hickory or Shagbark (*Carya ovata*).—On very heavy soils this tree may become a very good street-tree, but on light land it would be of no value. Its habit of growth is tall and upright. It has bright green foliage, changing to a bright golden color in the autumn, and is generally free from insect or fungous attack. It is even more difficult to transplant than the oak or chestnut, but it may be started from seed where it is to grow or be prepared for transplanting in the nursery or fields, as is the oak or chestnut.

Black Walnut (*Juglans nigra*).—No grander tree can be found among those native of the United States than the

* Since this was written the chestnut bark disease has appeared in many sections of the country, and those who have made the most careful study of it are fearful that it may spread so as to do serious injury. This disease attacks the bark of the trunks, main branches or small twigs, stopping growth and killing all parts outside of that attacked. The foresters of the States where the chestnut is abundant are watching the development of the disease and have issued bulletins as to its progress and the best remedies. Send to your experiment station or to the Department of Agriculture at Washington.

black walnut as occasionally seen in the Eastern States and very frequently in the West, but it is not often seen planted in avenues. It is difficult to transplant and requires a rather heavy soil for its best growth, but if properly treated, i.e., like the oak and chestnut, will make very beautiful street-trees. It is rather slow in growth while young, and requires a little care to prevent the formation of low-forked main branches. It is used as a stock upon which to graft the English or Persian Walnut.

The English or Persian Walnut (*Juglans regia*).—We all know the English, or Persian Walnut more properly, of our markets, and it is interesting to know that the tree is hardy as far north as Rochester, N. Y., and produces abundant crops of fruit. The trees in this latitude, however, are grown from seed and the nuts vary somewhat in size and quality, but compare well with those shipped to northern markets from more southern sections of the United States. The trees are upright, round-headed, much like the black walnut, and are worthy a place on the lawn or in any road-side avenue.

Tulip-tree (*Liriodendron tulipifera*).—This is one of our most beautiful trees, and if it could be more easily transplanted would be more largely used as a street- or avenue-tree than it now is. The fibrous roots of this tree are very succulent and easily injured by extreme pressure, or by exposure to drying winds or sun, and the greatest care must be exercised in transplanting it. If transplanted frequently in the nursery, it may be safely moved until it reaches the growth of 3 or 4 inches in diameter; otherwise only young trees should be used, and more careful protection be given them against injury than would be required for larger trees of other species.

Cucumber Magnolia (*M. acuminata*).—This beautiful native tree thrives as far north as New Hampshire, but is,

like the tulip tree, difficult to transplant. It is a little more spreading than the tulip tree, beautiful in bloom, and also in fruit.

Many other species of trees might be used for street or avenue decoration under some conditions, but the above list includes the best for general purposes. Scarcely one-tenth of our roadways, and probably much less, are adorned with ornamental trees; even in many of the thriving towns and cities little attention is given to this matter, and the author would urge the use of more variety of species and less of the stereotyped kinds, like the elm and maple.

Upright or Round-headed Trees

The following list, while not including all the trees desirable under varying conditions, yet contains the greater number of the most beautiful and especially those that will most certainly thrive under ordinary care. Many of the very new or rare varieties are not included for the reason that little is known of their real value, and it is almost the universal experience that a large percentage of the new introductions fail to realize the promise of their early growth, soon developing some weakness, disease, or other undesirable features, and their value cannot be determined until they have been tested for many years under various conditions of soil and exposure.

LIST OF UPRIGHT OR ROUND-HEADED TREES

Maple, English.	Chestnut, Horse.
“ Norway.	“ “ Red-flowered.
“ Sycamore.	Shad-bush.
“ Schwerdler’s.	Birch, European White.
“ Reitenbach’s.	“ Sweet or Cherry.
“ Red.	“ American White or Gray.
“ Tartarian.	Catalpa.
“ Japanese.	Cherry, Flowering.

Red-bud	Box-elder.
Fringe-tree.	Cork Tree, Chinese.
Dogwood, Flowering.	Locust, Yellow.
Hawthorn, English.	Willow, White,
Golden-chain.	“ Golden.
Beech, American.	“ Red-twiggied.
“ European.	Basswood or Linden, American.
Ash, European.	“ “ “ European.
“ Aucuba-leaved.	“ “ “ White-leaved.
Locust, Honey.	Mountain Ash, American.
Coffee-tree, Kentucky.	“ “ European.
China-tree.	“ “ Oak-leaved.
Plane-tree	Hop-tree.
Poplar, silver, or Abele.	Oak, White.
“ Bolles’.	“ Red.
“ Black or Italian.	“ Scarlet.
Peach and Plum, Flowering.	“ Swamp White.
Apple, Flowering.	“ Pin.
“ Chinese.	“ English.
Sweet Gum.	“ Fern-leaved.
Magnolia, Umbrella.	“ Variegated.
“ Cucumber.	“ Purple-leaved.
“ Soulange’s.	“ Pyramidal.
“ Swamp.	“ Chestnut.
“ Showy.	Elm, Scotch.
Mulberry.	Larch, European.

English Maple (*Acer campestre*).—A slow-growing maple forming a compact small tree, with corky ridges on the bark and handsome foliage.

Norway Maple (*A. platanoides*), Fig. 92.—While young this tree resembles somewhat the sugar-maple, but as it grows older it takes on a more rounded, massive head. The leaves are broad and thin, palmately lobed, and change to a light golden color in the autumn. Its large flowers and broad-winged fruit are also ornamental. It is easily transplanted and thrives in ordinarily good soil. This tree has proved very valuable as a street-tree in cities where a high-headed tree is not desired.

Schwedler’s Maple (*A. p. var. Schwedleri*).—During the spring and early summer the young leaves of this

tree are beautifully colored with purplish crimson, but they soon change to a dark bronze green. It is one of the most beautiful and ornamental of the maples during this early growth.

Reitenbach's Maple (*A. p.*, var. *Reitenbachii*).—This is not quite so beautifully colored in the spring as the last, but retains its color later in the season. Also very valuable.



FIG. 92.—Norway Maple (*Acer platanoides*). (Green.)

Sycamore Maple (*A. pseudo-platanus*).—A handsome broad-spreading tree, similar in form to the last, with larger, thick, dark green leaves. It is rapid in growth and free from the attack of insects and fungous pests. It is rather heavy and coarse in growth and is not as beautiful as either the sugar or Norway maple. In northern New England this tree has not proved quite hardy.

Red or Scarlet Maple (*A. rubrum*).—Our common swamp or red maple, found growing throughout our Eastern, Middle, and Western States, where it gives the most brilliant coloring to the landscape by its bright red flowers and fruit in the spring and the variously colored leaves in the autumn. It grows best in rather moist locations, is easily transplanted, and free from disease.

Silver Maple (*A. saccharinum*).—See Avenue- or Street-trees.

Tartarian Maple (*A. tataricum*).—A small tree with small cut and lobed leaves, somewhat like those of the gray birch, making an interesting and beautiful tree when in flower or in fruit and again by its brilliant coloring in the autumn.

Japanese Maples (*A. palmatum and japonicum*).—These are small-growing trees possessing a great variety of forms and coloring of foliage. The more beautiful forms with cut leaves and beautiful colors are very difficult to propagate and therefore expensive, but in deep warm soil a little sheltered from extreme drying winds they thrive well and make most beautiful ornaments. Where trees have reached fruiting size many beautiful forms may be grown from seeds which generally can be transplanted more successfully than grafted plants. The first-named species has produced the most varying forms, some of which have finely cut fern-like leaves, and of varying colors from dark green through many stages of variation to the darkest red or purple. Fig. 93.

Among the best of these are:

1. Red-leaved Japanese maple (*A. p., var. sanguineum*).
2. Purple-leaved Japanese maple (*A. p., var. atropurpureum*)
3. Purple cut-leaved weeping Japanese maple (*A. p., var. dissectum atropurpureum*).

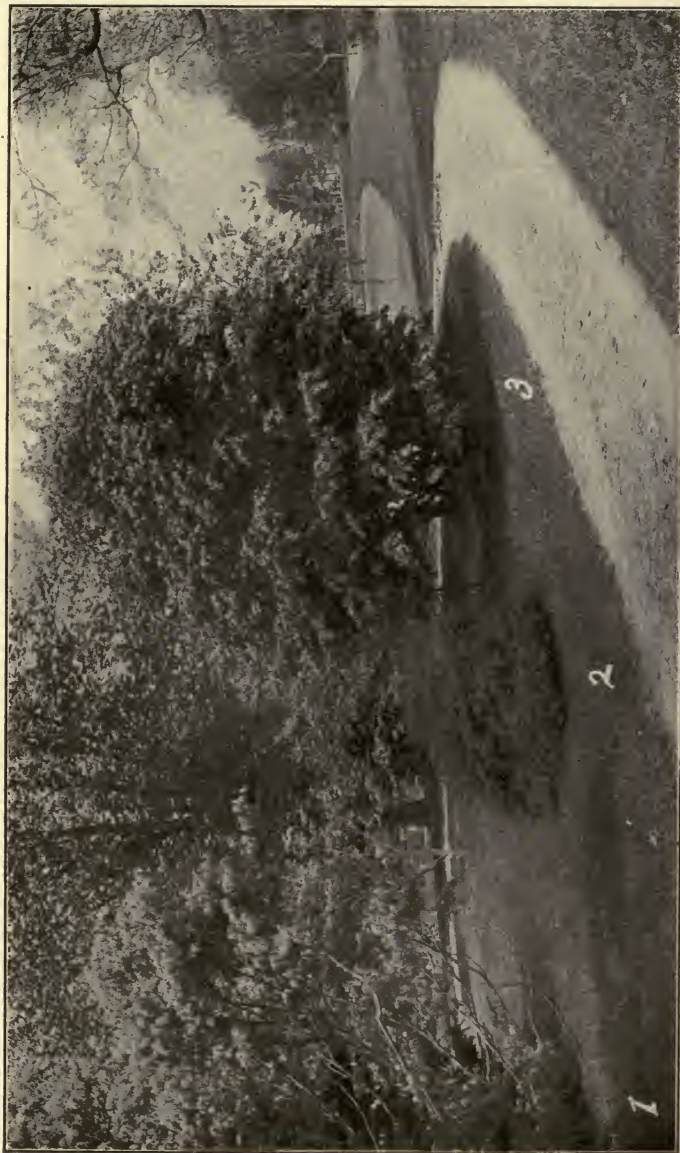


FIG. 93.—Japanese Maple (*A. palmatum*).

Green cut-leaved weeping Japanese maple (*A. p.*, *var. pinnatifidum*).

Rose-variegated cut-leaved weeping Japanese maple (*A. p.*, *var. dissectum roseo-pictis*).

Rose-margined Japanese maple (*A. p.*, *var. roseo-marginatum*).

Plain-leaved Japanese maple (*A. p.*).

Plain-leaved Japanese maple (*A. p.*, *var. Japonita*).

Golden-leaved Japanese maple (*A. japonicum*, *var. aureum*).

Crisped-leaved Japanese maple (*A. japonicum*, *var. crispum*).

Horse-chestnut (*Æsculus Hippocastanum*).—This tree possesses much beauty in its compact regular form and dark green foliage, but it is especially beautiful when in blossom with its large, compact panicles of white and rose-colored flowers. It is easily grown from seed, readily transplanted, hardy, and succeeds on a variety of soils.

Red-flowered Horse-chestnut (*Æ. carnea*).—Although not quite so conspicuous a tree as the last, it has more of the quiet beauty, with its dark green foliage and light red flowers.

Service-berry or Shadbush (*Amelanchier canadensis*).—A native tree of small size that produces the most beautiful masses of pure white flowers very early in the spring before any but the fruit-trees are in bloom. It is perfectly hardy, but is liable to be attacked by the apple-borer and must have frequent attention to prevent injury by this insect. It succeeds best in rather sheltered locations, and "though a native" deserves much more frequent use.

Canoe Birch (*Betula papyrifera*).—There is scarcely a more beautiful or easily grown tree than the canoe-birch. It succeeds in nearly all kinds of soil and is transplanted without much difficulty if trees of too large size are not attempted, those of 1 to 1½ inches in diameter being the best. It is especially beautiful when planted among ever-

greens or in contrast with trees and shrubs with bright yellow or red shoots for winter effect.

European White Birch (*Betula alba*).—Somewhat similar to canoe-birch, with smaller foliage and perhaps a little more graceful outline. A desirable tree, while young, though the cut-leaved weeping form is so much superior that the common type is not often planted. All of the forms of the European birch are short-lived, a great many specimens dying when they reach the age of 25 to 30 years.

Sweet or Cherry Birch (*B. lenta*).—Few of our native trees are more regular or graceful in outline than this species when grown in full exposure, but it being a common native tree and producing no conspicuous flowers it has not received the attention it deserves. Trees from the woods or roadside are difficult to transplant, but when grown in the nursery are easily transplanted. They succeed best in a rather moist soil.

American White or Gray Birch (*B. populifolia*).—A very pretty small tree when grown with a single trunk or in the group or clumps it so naturally makes. It is easily transplanted while small and grows well in the poorest kinds of soil. In transplanting large trees, growing in clumps, i.e., from 1 to 3 inches in diameter, the trunk should be cut down to the ground and one or more shoots be allowed to grow as desired. This treatment gives a vigorous straight growth that may be put into any shape desired, and the growth is very rapid.

American Chestnut (*Castanea Am. dentata*).—If allowed to grow with full exposure, this will make a very broad round-headed tree, and is very beautiful upon large grounds. Description and treatment for transplanting were given under Avenue- or Street-trees. The fruit of the Spanish and Japanese varieties is much larger, but not of as good quality as that of the American, and the trees are less

vigorous. Improved varieties of our native chestnut with fruit of large size are now offered and established trees are sometimes grafted with them successfully. The small



FIG. 94.—Western Catalpa (*Catalpa speciosa*).

and vigorous stocks are more certain of success in grafting than large and less vigorous ones.

Catalpa (*Catalpa speciosa*), Fig. 94.—A beautiful tree

of subtropical effect, producing very large heart-shaped leaves and large open panicles of flowers after nearly all other trees have bloomed. It is not quite hardy at the North and the trees should not be transplanted to full exposure of the lawn until they reach 2 to 3 inches in diameter to be most successful.

Flowering Cherries (*Prunus*, *sp.*).—Several of the



FIG. 95.—Flowering Dogwood or Cornel (*Cornus Florida*).

flowering cherries are offered by nurserymen. They are very beautiful for a few days when in bloom, but the flowers soon fall off and the show is short-lived. If planted in a light soil and grown slowly, they will live in a fairly good condition much longer than in a heavy or very rich soil. As they grow rapidly, they may be used temporarily, until

more permanent trees have reached a good growth, when they can be removed.

Redbud or Judas-tree (*Cercis canadensis*).—This is a very beautiful small tree, often taking the shrub form, producing an abundance of bright pink flowers before the leaves appear. The latter are of a very dark rich green color that is ornamental all summer. If grown too rapidly while young, it often winter-kills, like many of the trees coming from the middle and Southern States, and succeeds better in the lawn than if planted in a rich border; enough plant-food, however, must be used to produce a fairly vigorous growth.

Flowering Dogwood (*Cornus florida*), Fig. 95.—This small tree requires some protection from the hot sun and drying winds of winter to reach its greatest perfection. In full exposure the large white bracts about the flowers—the ornamental part of the blossoms—are often injured, but under the shade of larger trees, on the north slope of a hill or in the shade of buildings and in rather moist soil, it becomes one of the most beautiful of our native small trees. The pink or red form of this species is also very beautiful and valuable.

English Hawthorn (*Cratægus Oxycantha*), Fig. 96.—The double-flowering hawthorns are among the most beautiful of the small trees. The flowers are very brilliant and abundant and the foliage is of a beautiful dark-green color, but, like all the rosaceous plants, the flowers are of short duration. The tree is subject to the attack of both the flat- and round-headed apple-borers and San José scale, and the leaves to several species of fungi, for treatment of which see chapter on Insects and Fungi. The varieties known as Paul's new double white and red are among the best.

Golden-chain or Laburnum (*Laburnum anagyroides*).—Where this half-hardy shrub or small tree succeeds, it is one of

the most beautiful yellow-flowering trees in existence. It must be grown slowly in the lawn or where the roots of other trees keep the soil in a rather poor condition, although enough plant-food must be applied to produce a fair amount of wood.

American Beech (*Fagus grandifolia*).—This is one of



FIG. 96.—English Hawthorn (*Crataegus Oxycantha*).

the finest American trees, but requires a cool moist soil and protection from the hot sun. It is so difficult to transplant that it is not often seen in cultivated grounds, and is rather objectionable as a lawn-tree on account of the leaves, which adhere to the branches nearly all winter, even more closely than the white oak leaves. Under some conditions on a large place and among groups of evergreens the very light

brown or almost white winter foliage produces pleasing effects. Like the oak it is difficult to transplant.

European Beech (*F. sylvatica*).—Rather more graceful and compact in growth than our native species and more easily transplanted, but the winter foliage is of a darker color and not quite so ornamental. This species has produced many interesting and beautiful forms, which will be described under their proper heading.

European Ash (*Fraxinus excelsior*).—This somewhat resembles our native ash in form of tree and color of its foliage; it is easily transplanted and many of its varieties possess considerable value.

Aucuba-leaved Ash (*F. pennsylvanica*, var. *aucubæfolia*).—A beautiful tree with variegated foliage, but not so vigorous in growth as the common form. Valuable to plant in contrast with trees of purple or dark-green foliage.

Honey Locust (*Gleditschia triacanthos*).—A large tree with beautiful foliage and large, often branched thorns, which cover more or less the main branches and sometimes parts of the trunk. It varies much in shape, sometimes making very irregular growth, but it can be trained to a good form by a little judicious pruning. Compact, finely branched trees should be selected if planted on the lawn. Thornless varieties are common and are rather more beautiful.

Kentucky Coffee-tree (*Gymnocladus dioica*).—A hardy native tree with large feathery compound leaves, large stiff branches, and large panicles of flowers. Valuable for its subtropical effect.

China-wood (*Kæhreuteria paniculata*).—A hardy imported tree with good foliage and large panicles of yellowish white flowers in July; is valuable on account of its large masses of flowers opening so late in the season. It is not a long-lived tree unless planted in rather thin soil.

Sycamore, Plane-tree or Buttonwood (*Platanus occidentalis*).—Were it not for the disease which attacks this tree it would be among the most desirable for ornamenting large places or roadsides. Its most conspicuous features are the white and olive patches of its very smooth trunk and branches caused by the annual scaling off of the outer bark. A blight, however, attacks the leaves in the early summer, causing many of them to wither and fall off, but followed by perfect foliage again later in the season. As a result of this disease the branches become weakened and are easily broken off by wind and storm. The sycamore requires a moist rich soil and some very beautiful specimens are found growing in river-bottom lands in many sections of the country.

Poplars.—Very few, if any, of the poplars are of much value for permanent growth. They are very rapid in growth, easily transplanted, possessing many varying forms and colors, and useful where immediate effect is desired.

Silver Poplar or Abele (*Populus alba*).—This very rapidly growing tree is especially conspicuous when the silvery under-surface of the leaves is turned up by the wind. It has the fault, however, of throwing up suckers from the roots and is sometimes attacked by insects. To prevent the suckers from gaining strength and becoming troublesome, they should be pulled up, when the shoots separate from the root, and not be cut off at the surface. If cut off at the surface of the ground, the whole root system remains perfect and the buds are ready to start again with renewed vigor. Trees of this species are much more hardy along the coast of New England than more inland.

Bolles' Silver Poplar (*P. alba*, var. *Bolleana*).—This tree is of a more close and spiry growth than the last, with leaves of a darker color above and equally silvery beneath, and though not fully tested under all conditions promises to be more valuable than the common Abele.

Black Poplar (*P. nigra*), Fig. 97.—A most rapid growing tree of a pyramidal growth and dark-green leaves. Trees started from cuttings in 1874 were in 1892 more than $2\frac{1}{2}$ feet in diameter and 60 feet high. It has, however, developed a very serious fault in that the lower leaves are attacked by a leaf-rust. As this disease is con-



FIG. 97.—Black or Italian Poplar.

fined largely to the lower leaves, there is no difficulty in checking it, if not wholly preventing, by spraying with the Bordeaux mixture.

Lombardy Poplar (*P. nigra*, var. *italica*), Fig. 98.—It is perhaps more planted than any other species. While young it is clean and its strict habit of growth makes it desirable for screens and wind breaks, but as it grows older the lower

branches are diseased and break off, giving the tree an unkempt look.

Flowering Peaches and Plums (*Prunus sp.*).—Nothing can be more beautiful than the double-flowering peaches and plums, but the flowers are of short duration and the trees subject to all the diseases and insects that attack the fruit-bearing trees, and are therefore not largely planted.



FIG. 98.—Lombardy Poplar (*P. nigra*, var. *italica*).

They begin to bloom, however, in a few years from planting, and where the expense can be afforded may be planted temporarily to occupy the space until more permanent or slower-growing trees can give the desired effect of shade or ornament.

Flowering Apples.—While the blossoms of the apples are of short duration, like those of the plum, peach, and

cherry, the tree is hardy and lasts a much longer time. Among the best of these are:

Parkman's Double-flowering (*Pyrus Halliana*).—This is a rather dwarf tree with rich dark foliage and producing beautiful bright rose-colored double flowers.

Chinese Double-flowering Apple (*P. spectabilis*, var. *flore roseo-plena*).—Flowers rather larger and more showy than the last.

Siberian Apple (*P. baccata*), see Fig. 117.—This is one of the most beautiful forms of the Siberian apple, being covered in the spring with dense masses of single pink flowers and in the fall with golden yellow fruit less than $\frac{1}{2}$ inch in diameter. It seems to be hardy and long lived.

Liquidambar or Sweet-gum Tree (*Liquidambar styraciflua*).—A most beautiful tree of regular conical growth, fine dark foliage which takes on a beautiful red and yellow color in the autumn; a native of the middle and Southern States, but proves hardy in New England.

Umbrella Magnolia (*Magnolia tripetala*).—Of a rather broad irregular form, its large leaves, often nearly 2 feet long by 8 inches wide, and large showy white flowers make this tree a conspicuous object on the lawn. Like the tulip-tree and the other magnolias, its roots are soft and easily injured and must be treated very carefully in transplanting.

Cucumber Tree (*M. acuminata*).—A very fine tree, pyramidal in form and producing yellowish fragrant flowers in considerable abundance. It thrives best in deep warm soil. See Street-trees.

Soulange's Magnolia (*M. Soulangeana*), Fig. 99. This small tree is the most beautiful, most hardy and useful of the magnolias, the large cup-shaped blossoms of white and purplish color coming before the leaves, making it a very conspicuous and beautiful lawn-tree.

Showy Magnolia (*M. S. var. speciosa*).—Like the last,



FIG. 99.—Soulange's Magnolia (*Magnolia Soulangiana*).

but with rather smaller and lighter-colored flowers that last somewhat longer.

Swamp-magnolia (*M. glauca*).—A native tree found in swampy places from Maine to Georgia, and under favorable conditions is a great addition to our list of small trees. The foliage is bright green above and whitish beneath, and, like most of the small magnolias, is generally grafted on the tripetala stock. When grown in the shade of other trees, it holds its foliage nearly all winter.

Some others of the numerous species and varieties of magnolias succeed under favorable conditions, and where they thrive nothing gives more satisfaction.

Mulberry (*Morus alba and rubra*).—The mulberry is a tree of good form, with bright green foliage that is ornamental, and many persons are fond of the fruit. The most hardy of the fruit-bearing and perhaps the best varieties are the new American and Downing.

Box Elder (*Acer Negundo*).—A rather interesting tree with ash-like foliage and fruit much like that of the common maples. It soon takes an irregular form, is easily broken by wind or ice, and is rather short-lived.

Chinese Cork-tree (*Phellodendrom amurense*).—A very desirable round-headed tree of recent introduction, with foliage somewhat like the black walnut. Thus far it has proved clean and free from insects and disease and entirely hardy.

Yellow Locust (*Robinia Pseud-Acacia*).—Were it not that this tree is attacked by insects which injure the branches, stopping their growth and causing them to break off, and the growth of suckers from the roots, it would be a great addition to the list of beautiful ornamental trees. Its foliage is fine and feathery, of a rich dark-green color, and when in blossom we have no more beautiful tree. It is worthy of continued effort to find a remedy or preventive for the injury of insects,

and it has been suggested that by spraying the trunk and main branches with arsenate of lead and water or with this substance in the Bordeaux mixture, in the spring and early summer, this injury may be prevented.

Willows.—Like the poplars, the willows are easily propagated by cuttings and will grow in almost any soil. They grow very rapidly, but soon reach maturity and are not of much value for permanent growth. Some of the weeping varieties are graceful and very ornamental and will be described under the head of Weeping Trees.

White Willow (*Salix alba*).—The most rapid grower of all of the willows and often used to hold embankments and the soil along the borders of ponds and streams in place. While young it is regular in form and ornamental, but as it becomes older takes a more irregular growth and loses much of its beauty.

Golden Willow (*S. vitellina*).—Of the same form and habit of the white willow and possessing the same faults, but its golden bark in winter often forms a beautiful feature when planted among canoe-birches, red-twigged willows, or red dogwoods.

Red-twigged Willow (*S. vitellina*, var. *Britzensis*).—This is a comparatively new variety with red twigs which while young are nearly as red as those of the red dogwood.

Basswood or American Linden (*Tilia americana*).—A native tree of some value for ornamental purposes. It has large, dark green foliage and very fragrant white flowers suspended on long-winged peduncles in July. It makes a large tree in good soil, but becomes rather irregular as it reaches full growth.

European Lindens (*T. platyphyllos* and *vulgaris*).—Native of middle and northern Europe, of more regular form and smaller foliage than the last, and but for the injury caused by borers and a leaf-blight they would be most valu-

able pyramidal trees. When not injured by the above pests, they grow very rapidly and reach large size. (See chapter on Insects and Diseases.)

White-leaved European Linden (*T. tomentosa*).—A vigorous tree with a more rounded head than the last and with leaves dark green above and silvery white beneath. Subject to the same pests as the last.

American Mountain Ash (*Sorbus americana*).—One of the most beautiful native small trees often found growing on our mountains. Its large cymose panicles of white flowers are very beautiful, and there is scarcely anything more beautiful than the large clusters of dark red fruit in the autumn and early winter. It is so seriously injured by the apple-borer, however, that it is only by the most constant attention that it can be grown so as to reach large size.

European Mountain Ash (*S. Aucuparia*).—Very similar to the last in habit of growth and foliage, but with larger and lighter-colored berries. It requires the same treatment to prevent injury from insects as the last species.

Oak-leaved Mountain Ash (*S. a., var. quercifolia*), Fig. 100.—A very interesting form of the last species, of a more compact habit, however, and having leaves somewhat like those of the English oak. Attention must be given this tree to prevent injury from borers.

Hop Tree (*Ptelea trifoliata*).—This small round-headed tree possesses peculiar beauty of form and dark, rich color of foliage, but its most striking feature is the masses of circular-winged fruit that somewhat resemble large clusters of the fruit of the common hop-vine.

Oaks.—These trees are, many of them, emblems of grandeur and strength, yet some of the species and varieties possess graceful and pleasing outlines and beautiful colors of foliage. In size many of them are not suited to small places, and yet a single large oak with a cottage and

accompanying outbuildings nestling under its branches affords a most beautiful picture of comfort and protection of which the home is our best emblem. Perhaps the most objectionable feature of these trees as a lawn ornament is the persistency with which the foliage of some species adheres in the winter. In the grove mingled with evergreen and other deciduous trees this feature may have rather a pleasing



FIG. 100.—Oak-leaved Mountain Ash (*Sorbus aucuparia quercifolia*).

effect, but in a conspicuous place on a lawn its persistent brown leaves are not pleasing objects for continued view during the winter. The oaks require a strong soil to reach their greatest perfection, but they do well under a great variety of conditions. They are difficult to transplant and need the special preparation recommended for the oak, black walnut, etc., on pages 161 and 163.

White Oak (*Quercus alba*), Fig. 101.—The grandest of all the oaks and one of the most common. It is rather slow in growth and wherever large trees are found, whether by the roadside or in the field, they should be preserved and the most be made of their picturesque grandeur. The long adherence of the brown leaves of this and the pin oak in the winter



FIG. 101.—White Oak (*Quercus alba*).

makes them sometimes objectionable on small places, but on a large place and in among evergreens they are an interesting feature of the winter landscape. This applies more especially to the white and pin oak.

Red Oak (*Q. rubra*).—See Street- or Avenue-trees.

Swamp White Oak (*Q. bicolor*).—Somewhat similar in appearance to the white oak, but rather more upright in growth and with a heavier foliage. It succeeds best in a moist soil.

Pin or Swamp Oak (*Q. palustris*), Fig. 102.—This beautiful oak is only of medium size and takes the most regular pyramidal form; the leaves are deeply lobed, dark green in color, changing to a beautiful scarlet-crimson in



FIG. 102.— Pin Oak (*Quercus palustris*).

autumn. Its acorns are small, set in a very shallow cup, and the branches stand out nearly at right angles with the trunk or with age assume a drooping form. It is a tree that should be more planted than it is.

Scarlet Oak (*Q. coccinea*).—This tree resembles the red oak (see Avenue-trees) somewhat in outline, but with a much more deeply lobed leaf and an acorn of medium size nearly half immersed in the cup. It is an upland oak and takes on a beautiful scarlet color in autumn.

English Oak (*Q. pedunculata*).—This oak is medium to large in size, with rather small leaves much like our native white oak, but more graceful and compact in outline. It takes a greater variety of forms than any other species, varying from the most close and upright pyramidal form to the low-spreading or weeping tree, and in foliage from the darkest green through the lighter shades of green to golden yellow and to the rich purple shades of the copper beech. In form of the leaves it varies from those with broad, almost unbroken outline to the deeply cut, almost fern-like leaves. These peculiar and marked forms, however, must be propagated by budding or grafting and are often of slow growth and expensive. Among the best forms are:

Fern-leaved oak (*Q. p.*, *var. asplenifolia*).

Variegated oak (*Q. p.*, *var. variegata*).

Purple-leaved oak (*Q. p.*, *var. atropurpurea*).

Pyramidal oak (*Q. p.*, *var. fastigiata*).

Chestnut Oak (*Q. Prinus*).—The leaves of this species are very much like those of the common chestnut, but not so narrow or so pointed. It succeeds best in rather strong rocky soil.

Elms.—Under the heading of "Street-trees" the white and slippery elm were described. Both of these species are equally adapted to the lawn, where high-spreading forms are desired, but they are gross feeders and it will be found somewhat difficult to make other trees, shrubs, or plants grow near them. An abundance of plant-food, however, applied each fall will help to make both the elms and what-

ever may be planted among their roots grow satisfactorily. To succeed with strong-feeding plants, like shrubs, bulbs, bedding plants, etc., under the shade of elm trees, the soil and all of the fibrous roots should be dug out with a sharp spade, a foot or more deep, filling up the space with turfy loam, when if there is moisture enough supplied a good growth will take place. If the trees are large this treatment may be necessary each year.

English Elm (*Ulmus campestris*).—Although of a sturdy, vigorous, upright growth, it does not reach the beauty and grandeur of our American elm. As with the English oak, this species takes many interesting forms, some of which are very beautiful.

Scotch Elm (*U. scabra*).—Much like the last, but with a rather more upright and heavy growth.

All of the elms are subject to the attack of the elm-scale (*Gossyparia*), canker-worm, and the elm leaf-beetle, which see on pages 270-274.

European Larch (*Larix decidua*).—This is one of the most beautiful and rapidly growing trees, and except when injured by the pine saw-fly, an insect the larvæ of which destroy the foliage in the summer, and an aphid or plant-louse that sometimes checks its growth, is a most desirable tree. The foliage is very fine and feathery, and in the spring of the most delicate green color, while in the autumn it changes to a beautiful golden color and hangs a long time, which gives very beautiful effects in contrast with other foliage or by itself. It is best transplanted in the fall and succeeds upon the poorest of soils. The lateral branches should be encouraged to make a full growth by heading in the top while young, yet at the same time its regular pyramidal habit of growth should be preserved.

Weeping Trees

Few more beautiful objects can be seen than some of the many weeping trees that are now being offered by nearly all of our nurserymen. They possess beauty of form, grace



FIG. 103.—Weeping Maple.

in outline, and often produce beautiful flowers. They are especially adapted to planting upon the lawn. Most of the trees of this type are grafted upon other stocks, which in many cases results in a smaller or slower growth and shorter life and adds very much to their cost.

LIST OF WEEPING TREES

Maple, Cut-leaved Weeping.
 Birch, Cut-leaved Weeping.
 Cherry, Weeping Japanese.
 Dogwood, Weeping.
 Beech, Weeping.
 Ash, Weeping.
 Poplar, Weeping.

Mulberry, Weeping.
 Willow, Babylon Weeping.
 Willow, Kilmarnock Weeping.
 Willow, Thurlow's Weeping.
 Willow, Purple or Am. Weeping.
 Elm, Camperdown.

Cut-leaved Weeping Maple (*Acer saccharinum*, var. *Wieri*), Fig. 103.—A very graceful weeping tree with deeply cut leaves, dark green above and silvery white beneath. When allowed to grow without care, it often forms forked branches that are liable to split down with heavy weight of snow and ice. To avoid this, only one leader or main branch should be allowed to grow at first, and all laterals tending to outgrow the leader should be headed in to keep a good balance of the tree. Some very fine trees are grown from seed of the cut-leaved varieties, but the best forms must be obtained by grafting upon the common silver maple stock.

Cut-leaved European Weeping Birch (*Betula pendula* var. *dalecarlica*), Fig. 104.—On account of its rapid growth, the ease with which it is transplanted, and its great beauty, both in winter and summer, this is one of the most satisfactory of the weeping trees while young. It is especially effective with a background of evergreens or in winter in contrast with red- or yellow-twigged willows. It grows well in poor soil and is easily transplanted while young, but not so readily when it reaches two or three inches in diameter. This variety is commonly grafted or budded on the common form of *B. alba*. It has not proved a long-lived tree, being often attacked by a disease when 20 to 30 years old that frequently kills the whole tree in one or two seasons.

Young's Weeping Birch (*B. p.*, var. *Youngii*).—A form of the common gray birch. Smaller and less upright than the

last, but with a more drooping head and much smaller leaves. It forms a beautiful object on the lawn. Short lived on low wet land.



FIG. 104.—Cut-leaved Weeping Birch (*Betula pendula, dalecarlica*).

Weeping Cherries and Plums.—Nothing can be more beautiful than some of the double- and single-flowered weeping cherries and plums, but, like those of the same

genus already described, they are short-lived, liable to injury from insects and fungous pests, and the cherries especially to injury to the trunk by freezing. One of the most beautiful is the

Japanese Weeping Cherry (*Prunus pendula*).—While young this is one of the most beautiful objects ever introduced. It is, however, grafted upon an upright stock, and we have thus far found nothing as a stock that



FIG. 105.—Weeping Beech (*F. syl., pendula*).

will withstand the climate of middle and northern New England, where the trunk is split open by the action of frosts. Further south it may not be injured in this way by severe winters.

Weeping Dogwood (*Cornus florida, var. pendula*).—This small tree is not more beautiful than the upright form of the species already described, but it is unique and attractive when well grown.

Weeping Beech (*Fagus sylvatica*, var. *pendula*), Fig. 105.—Although not regular in outline, this tree has a picturesque beauty peculiar to itself. It is vigorous in growth and desirable. Succeeds only on heavy soils.



FIG. 106.—Teas' Weeping Mulberry (*Morus alba*, var. *laciniata pendula*).

Weeping Ash (*Fraxinus excelsior*, var. *pendula*).—A rather stiff, drooping tree, with beautiful foliage, and although not equal in graceful beauty to many of the weeping trees, it is useful in some combinations.

Weeping Mulberry (*Morus alba*, var. *laciniata pendula*), Fig. 106.—One of the most graceful and beautiful fountain-shaped trees. Its branches are slender and fall away from the upright stock upon which it is grafted in a very graceful fountain-like manner, and its deeply cut and



FIG. 107.—Camperdown Elm (*Ulmus scabra*, var. *pendula*).

lobed bright-green leaves add much to its lightness and beauty. It has thus far proved hardy and free from disease or insect pest.

Babylon Weeping Willow (*Salix babylonica*).—The largest and most rapidly growing of the very graceful weeping trees; it is a very beautiful tree, but has some of the faults of other

species of willows, and its branches are easily broken off by wind and storm. It is especially adapted to locations near water and grows most rapidly in a moist soil. See Fig. 84.

Thurlow's Weeping Willow (*S. elegantissima*).—As far as tested this new tree promises to be the most satisfactory and beautiful of the weeping willows. In form it is upright with the branches bending toward the ground. Its young branches are bright green, which will form a pleasing contrast with the yellow and red shoots of the other willows and the clean white branches of the birches.

Purple Weeping Willow (*S. purpurea*, var. *pendula*).—The glaucous foliage of this native willow, together with the purple-colored shoots, gives a shade of color that is very desirable in ornamental grouping in winter.

Camperdown Elm (*Ulmus scabra*, var. *pendula*), Fig. 104. —For an arbor-tree, one that will give a close shade and last a long time and is decidedly graceful in outline, this tree stands at the head of the list. To get the best results, it should be grafted at least six feet from the ground on the upright *scabra* stock; otherwise the branches will be too low to sit under conveniently, and when reaching near the ground many of the lower branches will soon decay.

Trees with Deeply Cut Foliage

Maple, Wier's Cut-leaved.	Maple, Variegated-leaved, Jap
Birch, Cut-leaved Weeping.	Beech, Fern-leaved, Jap.
Maple, Purple, Cut-leaved, Jap.	Ash, Cut-leaved, Jap.
Maple, Green Fern-leaved, Jap.	Oak, Cut-leaved, Jap.

Of the above *Wier's Cut-leaved Maple* and *Weeping Cut-leaved Birch* have already been described under "Weeping Trees," Figs. 106 and 103, and are among the very best of this group.

Japanese Maples (*Acer polymorphum*, vars.).—Few trees have produced such a variety of foliage or forms of growth as

this species. Some of the most beautiful of the forms have already been mentioned, but no description given. Among the best are the following, Fig. 94,(3):

Japanese Purple Cut-leaved Maple (*A. p.*, *var. dissectum purpureum*).—A beautiful weeping, cut-leaved, small tree, very slow in growth, but the leaves are so deeply cut and fern-like, and with deep purple color, that one is well repaid for considerable petting and long waiting if he succeeds in making it grow to perfection. It must be planted in a deep, moderately rich soil, and should have an annual dressing of rich manure in the fall for 3 or 4 feet around the trunk.

Japanese Green Fern-leaved Maple (*A. p.*, *var. pinnatifidum*).—A variety that is rather more vigorous than the last, but with green fern-like foliage and with the same graceful drooping habit.

Variegated Fern-leaved Maple (*A. p.*, *dissectum roseopictum*).—Equal to the last in vigor and perfection of foliage, but many of the leaves are beautifully bordered and marked with white, pink, and rose-color, especially those on the inside of the shrub.

Fern-leaved Beech (*Fagus sylvatica*, *var. heterophylla*).—In a heavy soil where other varieties of the beech succeed this tree will thrive and is very beautiful and desirable. Fig. 108.

Cut-leaved Ash (*Fraxinus excelsior*, *var. crispa*).—The leaves of this variety are irregularly cut and divided and the tree presents a very pleasing appearance. Requires a heavy soil.

Cut-leaved Oak (*Quercus pedunculata*, *var. filicifolia*).—For a slowly growing tree this is one of the most permanent and in strong soil succeeds with good ordinary care. Like all the other oaks, it is difficult to transplant.



FIG. 108.—Fern-leaved Beech (*Fagus sylvatica*, var. *heterophylla*).

Trees with Colored Foliage

Maple, Reitenbach.	Beech, Copper.
Maple, Schwedler's.	Beech, Rivers' Purple.
Maple, Japanese.	Poplar, Golden.
Maple Purple Sycamore.	Plum, Purple-leaved.
Maple, Tricolored Sycamore.	Oak, Purple-leaved.
Birch, Purple-leaved.	

Reitenbach's Maple (*Acer platanoides*, var. *Reitenbachii*) and **Schwedler's Maple** (*A. p.*, var. *Schwedlerii*) have already been described under Lawn-trees.

Japan Purple-leaved Maple (*A. palmatum*, var. *atropurpureum* and *sanguineum*), Fig. 94".—These two varieties are very much alike, but the first has somewhat darker foliage with a deeper-lobed and rather narrower leaf than the last. They grow nearly as large as the common form of this species, i.e., 10 to 15 ft., and the foliage is the most beautifully colored of all of the purple-leaved trees. They require a deep, warm soil, and perhaps a little shelter from too much exposure, and are more hardy when grown in the lawn than when grown in a rich border.

Purple Sycamore Maple (*A. pseudoplatanus*, var. *purpurascens*).—A heavy, broad-headed tree, with dark bronze-green foliage, but not of the decided color possessed by Schwedler's or the Japanese species. Not quite hardy in moist, cold soils.

Tricolored Sycamore Maple (*A. p.*, var. *tricolor*).—Of the same form as the last, but with leaves beautifully marked with white, green, and purple. Very interesting but not a conspicuous tree.

Purple-leaved Birch (*Betula pendula* var. *purpurea*).—A tree of good form and with conspicuous colored foliage in spring, soon changing to a bronze green. The contrast of this dark foliage with the white bark of the branches

makes it a very desirable tree. It succeeds best upon very thin soil.

Purple-leaved Catalpa (*Catalpa bignonioides*, var. *purpurea*).—Were this tree perfectly hardy in the northern sections of the country it would be one of the most desirable trees for the lawn. It, however, is not quite hardy while young, and, as with the *C. speciosa*, it must be kept in the shelter of the nursery until it is 3 or 4 inches in diameter at the base, when, if it has been transplanted in the nursery several times, it may be safely moved to the lawn, where it will succeed better than in a rich border. The foliage is large, dark bronze purple, growing somewhat lighter with the advance of the season.

Copper-leaved Beech (*Fagus sylvatica*, var. *purpurea*).—No tree is more conspicuous on the lawn or in groups than the purple or copper beech, and large numbers of them are planted each year; yet we see very few specimens more than a few years' old. The reason for this undoubtedly is that they do not succeed in all soils and in full exposure and that they are sometimes attacked by borers which work in the trunk near the ground (see Chap. XV). The varieties will grow only under the conditions of the common types, requiring a deep, moist soil, some shade or shelter while young, and a cool northerly exposure.

Rivers' Purple Beech (*F. s.*, var. *Riversii*), Fig. 109.—This variety has more sharply cut and darker colored leaves than the last, and may be preferred by many, though both are extremely beautiful, and change about equally to the bronze-green color as they mature.

Golden Poplar (*Populus deltoides*, var. *aurea*).—This is the most rapidly growing of the golden-leaved trees we have, and is of value planted in contrast with purple- and dark-leaved varieties of trees. Like some of the other species of poplars, it is short lived and the leaves are often seriously

injured by rust in August, which causes defoliation before the buds are matured. The treatment required to destroy this rust is the same as for that described for the black poplar. (See Chap. XV.)



FIG. 109.—Rivers' Purple Beech.

Purple-leaved Plum (*Prunus Pissardi*).—Were it not for the short life of this tree it would be one of the greatest acquisitions. It is rapid in growth, easily transplanted, of good form, and retains its dark purple color longer than any

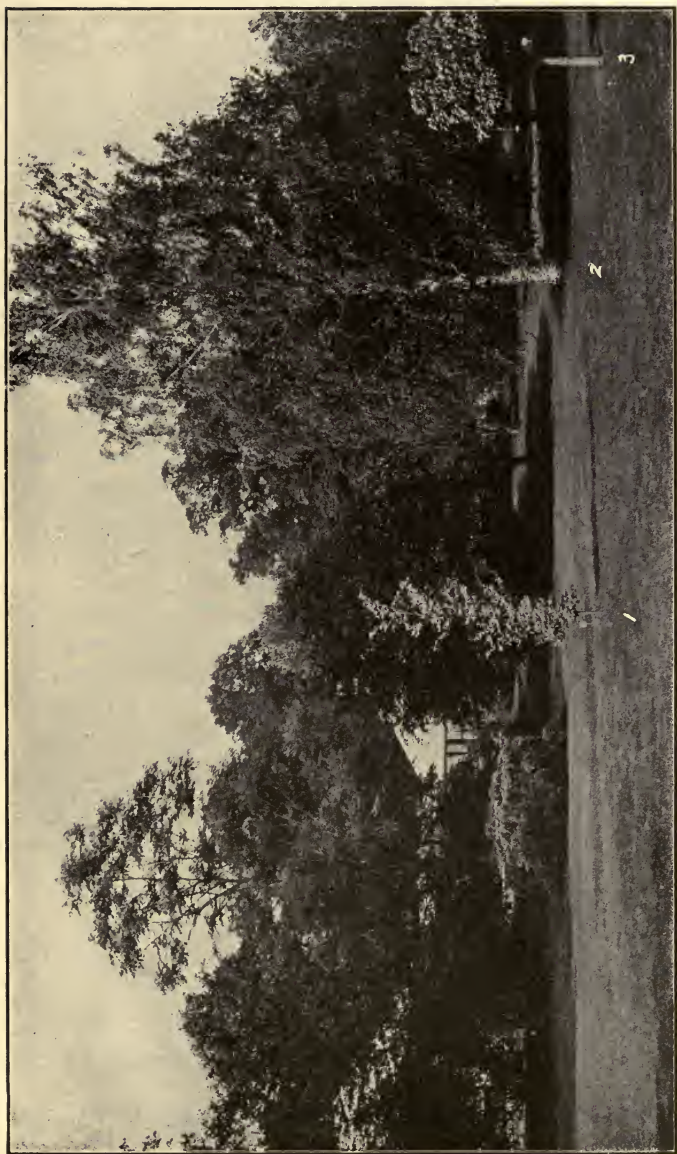


FIG. 110.—1. Golden Elm. 2. Cut-leaved Weeping Birch. 3. Chinese Catalpa.

other tree. It is much subject to the attack of the San José scale, which has destroyed a great many trees.

Purple-leaved Oak (*Quercus pedunculata*, var. *atropurpurea*).—The characteristic of strength typified by the oaks makes any of the species of interest, and if in addition to this character they possess strikingly beautiful features they become all the more valuable. This tree has dark purple or bronze-green foliage all summer, is moderately vigorous in growth, and very desirable.

Golden-leaved Oak (*Q. p.*, var. *Concordia*).—This is perhaps the best of the golden-leaved oaks, and is very beautiful when the leaves first unfold, but it loses something of its freshness and beauty as the season advances. Its chief value consists in the use that may be made of it in toning down the extreme shades and tints of other trees.

Golden-leaved Japanese Maple (*Acer jap.*, var. *aureum*).—A most beautiful tree for planting with the purple-leaved forms of *A. palmatum*.

Golden Elm (*Ulmus campestris*, var. *aurea*), Fig. 110,(1).—This beautiful tree is of slow growth, but planted in moderately rich land succeeds well and is worth repeated trials to secure the establishment of even a single specimen.

Chinese Catalpa (*Catalpa Bungei*), Fig. 113.—A most interesting round or umbrella-formed tree with large, bright-green foliage. In slight shelter and in a deep, warm, sandy loam it proves hardy and valuable.

CHAPTER XI

EVERGREEN TREES

EVERGREEN trees are indispensable in some features of ornamental gardening. They are especially valuable for screens and wind-breaks, for a background against which to group trees with beautifully colored leaves, flowers or branches, and for winter decoration. The too abundant use of evergreens results in a sombre effect and often in an unhealthful condition if planted too close to the buildings. The limit and scope of this work will allow of the description of only the most beautiful, and those that are most easily transplanted and succeed under a wide range of conditions. Small evergreens should not be planted where teams, persons, or animals passing will brush against them continually during the winter, as they are very easily injured in this way while frozen.

Evergreens may be transplanted at almost any season of the year, but great care needs to be taken that the roots do not become dry by exposure to sun and wind, and if possible a moist day should be selected for the work. Evergreens, like all other trees and shrubs, must have an abundance of plant food. The annual dressing of compost should be applied to them as much as to the flowering shrubs, at least until they have become thoroughly established. Nearly all are also benefited by pruning, especially those that tend to grow into a close spiry form. This is best done in the spring before growth begins, though it may be done at any time with fair success. Among the best of the evergreen trees are:



FIG. 111.—1. Douglas Fir. 2. Swiss Stone Pine. 3. Nordmann's Fir.

Spruce, White.
 Spruce, Norway.
 Spruce, Inverted Norway.
 Spruce, Colorado Blue.
 Fir, Nordmann's.
 Juniper, or Red Cedar.
 Juniper, Prostrate.
 Pine, Austrian.
 Pine, Weymouth or White.

Pine, Bhotan.
 Pine, Swiss Stone.
 Cypress, Japanese.
 Cypress, Japanese, Thread-like.
 Arbor-vitæ, American.
 Arbor-vitæ, Siberian.
 Arbor-vitæ, Pyramidal.
 Arbor-vitæ, Globe.
 Arbor-vitæ, Golden.



FIG. 112.—Norway Spruce.

White Spruce (*Picea alba*).—A native tree of considerable beauty of form, rapid growth, and good color. It is easily transplanted and grows in a variety of soils.

Norway Spruce (*Picea excelsa*), Fig. 112.—The most rapidly growing of the spruces and very beautiful while young, but after it reaches the age of 20 years and upwards its lower branches begin to fail and must be cut away. To prevent this in a measure severe heading in of the leader should be

practised, which forces the growth into the lower branches. It grows rapidly even on very poor soil. The weeping variety (*P. e.*, *var. inversa*) is unique in form, the branches hanging downward close to the trunk, presenting a very picturesque and unusual appearance.

Colorado Blue Spruce (*Picea pungens*), Fig. 113.—Seedlings of this most beautiful spruce vary very much in



FIG. 113.—Colorado Blue Spruce (*Picea pungens*).

color, some being dark green, like the Norway spruce, while others are of the most beautiful glaucous or bluish-green color. Some of these very “blue” specimens may be found in every lot of seedlings, but to obtain them with certainty and in large numbers scions are taken from the best-colored specimens and grafted into the ordinary *pungens* or *excelsa* stocks. Thus the most perfectly colored specimens become rather expensive. They make most beautiful

lawn-trees either singly or in groups of the same species or arranged with others of varying colors.

Nordmann's Fir (*Abies Nordmanniana*), Fig. 111.—A slowly-growing tree of very dark green color and the most perfect pyramidal growth. The contrast of the new growth



FIG. 114.—Austrian Pine (*Pinus Laricio*, var. *austriaca*).

in the spring, which is almost golden color, with the very dark color of the old foliage is very beautiful.

Red Cedar (*Juniperus virginiana*).—A native tree generally conical in form, found growing on dry, rocky hillsides, and is very pretty and useful for decorating such



FIG. 115.—Japanese Plumed Cypress (*Chamaecyparis pisifera*, var. *plumosa*).

It takes on more or less of the brownish green, like the arbor-vitæ, during the winter.

Prostrate Juniper (*Sabina* and *J. horizontalis*).—Although of rather coarse growth, its prostrate habit makes it valuable for decorating rocky grounds, on large places, among ledges and boulders, where it is very effective. The golden variety, the new growth of which is of golden color, is very pretty in contrast with the dark green of the original form.

Austrian Pine (*Pinus Laricio* var. *austriaca*), Fig. 114.—This is rather a heavily growing tree, somewhat resembling our native red or Norway pine, but with a more compact growth, longer and darker green leaves, and succeeds in a variety of soils. The most valuable of the hard pines for ornamental purposes, but should not be planted on small places.

White or Weymouth Pine (*P. strobus*).—This is one of the most valuable native trees for a quick growth, growing rapidly in almost any kind of soil. While young it is very beautiful, perfect in outline, and of a beautiful glaucous color, but as it reaches maturity it becomes more and more spreading and irregular, which while not unpleasant under some circumstances is not well adapted to use upon the ordinary small lawn. It is one of the most easily transplanted trees we have, whether taken from the nursery, the pastures, or woods. It stands pruning well and may be trained into a great variety of forms, though in its natural growth while young it possesses more real beauty than any closely-shaven or unnaturally trained form.

Bhotan or Long-leaved Pine (*P. excelsa*).—Somewhat resembling the last, but with much longer and more beautiful leaves; the form of the tree, however, is not so graceful or regular. Not quite hardy in the Northeastern States.

Swiss Stone-pine (*P. Cembra*), Figs. 111-2.—This species is very much like the native white pine in color, but it is more

compact in form, making a pyramidal growth. It is rather slower in growth than the latter species and much more beautiful, but not so easily transplanted.

Japanese Cypress (*Chamæcyparis pisifera*), Fig. 116.— This is the largest and one of the most hardy of the many



FIG. 116.—Japanese Cypress (*R. picifera*).

species of this genus that have been introduced from Japan. The foliage is dark green and somewhat fern-like in the arrangement of its small branches. While young it is compact and very beautiful, but as it reaches maturity it becomes more open and irregular in growth, though it still retains much of its beauty. The leader should be cut out once in three or four years to force growth into the lower branches.

Japanese Thread-like Cypress (*C. pisifera* var. *filifera*).—More beautiful than the last and equally hardy. It is of light-green color with thread-like terminal branches and very graceful and perfect in form. One of the most desirable of evergreens of medium size. Japanese plumed cypress, *C. pisifera* var. *plumosa*, Fig. 116, foliage rather more beautiful than last two but not quite as hardy.

American Arbor-vitæ (*Thuja occidentalis*).—A native



FIG. 117.—Group of Arbor-vitæ and Flowering Apple.

tree of beautiful form and color while young, but soon becomes irregular and tends to lose its lower branches as it increases in age. It has produced a great many beautiful forms, some of which are much more valuable than the original type. It should not be planted where there is very great exposure to prevailing winds or where teams, persons, or animals will come in contact with it during the winter.

when the branches are frozen, for nothing is more destructive to its beauty than contact in zero weather. Among the most valuable varieties are the following:

Siberian Arbor-vitæ (*T. o.*, *var. Wareana*, or *Siberica*), Fig. 117.—Compact, dwarf, conical in form, of a much darker green than most of the varieties, and it takes on less of the brown color during the winter than any other form of the species; especially valuable for hedges.

Pyramidal Arbor-vitæ (*T. o.*, *var. pyramidalis*).—Of close, compact, pyramidal form, it serves a good purpose where small columnar trees are desired. It is of about the same color as the original type of the species.

Globe Arbor-vitæ (*T. o.*, *var. globosa*).—Compact and globular in form, of a dark-green color, and valuable for low hedges or for small, very low, round-headed trees.

Golden Arbor-vitæ (*T. o.*, *var. aurea*).—Several varieties with golden-tipped branches or with the whole foliage of a very light green color are offered by nurserymen, and planted in contrast with dark green varieties they produce a very pleasing effect. Perhaps one objection may be urged against them, as with other trees with yellow foliage, that they have the appearance of sickly trees, but when properly grouped they may be made to tone down sharp contrasts and to add tints to groups not otherwise obtainable. The small varieties of evergreens, junipers, arbor-vitæ, retinosporas, yews, etc., and the dwarf forms of the larger growing kinds are being largely used, banked against the front of verandas, the base of buildings, pergolas, summer houses, etc. A variety of these neatly grouped in this way adds much to the beauty of the grounds between the lawn and the house if the latter is not too close to the road. However, in such case great care must be taken that the soil does not become very dry during the summer, especi-

ally when planted on the south side. To prevent this a spray of water should be allowed to run over the whole surface several hours once or twice each week in times of drouth. They are also liable to be broken over by heavy snows in winter.

CHAPTER XII

ORNAMENTAL SHRUBS, CLIMBING VINES, AND HEDGE PLANTS

FLOWERING shrubs and those with brilliantly colored foliage are to ornamental gardening what the finishing



FIG. 118.—Author's Weed Killers.

touches are to the picture or the varnishing is to furniture. They help to fill out the well-rounded forms of groups of trees and, possessing more variety of colors of flowers and foliage than the large trees, they add beautiful bits of color

to often otherwise tame garden-work. Many of them supply flowers for inside decoration of the rooms. Being small in size, they are especially useful in planting places of small extent, are comparatively inexpensive, and reach maturity in a very short time. They are very useful in ornamenting the foreground where it is desired to take in views above and beyond the limits of small grounds, and serve the purpose of a setting or ornamentation close up to the dwelling and over which may be viewed the more extended lawn decoration. These plants are better set out in groups or beds than singly, the land being thoroughly fitted by deep spading in of a liberal amount of fine stable manure and some leaf mould. When planted in this way the surface of the beds should be covered over in the fall of each year with rich stable manure, the finer particles to be spaded in the next spring. Weeds must be kept down during the summer with hoe and rake and hand pulling. The author's weed killers are shown in Fig. 118. When shrubs are set in the lawn, the soil around them should be kept cultivated, as shown in Fig. 134. Among the most desirable are the following:

Azalea, Pink.
Azalea, Flame-colored.
Azalea, Vasey's.
Azalea, Japanese.
Azalea, Ghent.
Aralia, Hercules Club.
Aralia, Japanese.
 Barberry, Am.
 Barberry, Dwarf.
 Weigela, Variegated.
 Silver-thorn.
 Burning Bush.
 Burning Bush, Corky-barked.
 Exochorda.
 Golden-bell.
 Golden-bell, Fortune's.

Pepper Bush, Sweet.
 Dogwood, Red-twiggled.
 Dogwood, Variegated.
 Filbert, Purple-leaved.
 Quince, Japanese.
 Daphne.
 Deutzia, Double-flowered.
 Deutzia, Slender.
 Weigela, Rose-flowered.
 Elder, Red-fruited.
 Spiræa, Golden.
 Spiræa, Bridal-wreath.
 Spiræa, Lobed.
 Spiræa, Bumald's.
 Spiræa, Thunberg's.
 Spiræa, Van Houtte's.

Golden-bell, Weeping.	Snowberry.
Silver-bell.	Indian Currant.
Rose of Sharon.	Lilac, Common.
Hydrangea, Japanese.	Lilac, Persian.
St. John's-wort, Shrubby.	Lilac, Japanese Tree.
Honeysuckle, Tartarian.	Lilac, Josikea.
Mock-orange.	Lilac, Downy.
Mock-orange, Golden.	Cranberry Bush.
Mock-orange, Large-flowered.	Snowball, Japanese.
Purple Fringe (Smoke Tree).	Roses, Bedding.
White Fringe.	Roses, Moss.
Sumac, Cut-leaved.	Roses, Climbing.
Sumac, Japanese.	Roses, Japanese.
Elder, Golden.	Rose, Japanese Running.

Pink Azalea (*Rhododendron nudiflora*).—A shrub 4 to 6 feet in height, flowers pink to nearly white appearing before or with the leaves. One of the most beautiful of our native shrubs and one that succeeds best in rather cool, slightly shaded places. It is easily transplanted and may be very successfully moved from the borders of woods to the lawn if taken in clumps with something of a bog upon the roots. The plants are improved, however, if taken up and grown in a cool, somewhat shaded nursery for a year or two before transplanting permanently.

Flame-colored Azalea (*A. (R.) calendulacea*).—A shrub 4 to 10 feet high. Flowers orange-yellow or flame red, often 2 inches broad, appearing with the leaves. A beautiful species from the mountainous regions of the South and requiring a little protection in New England, but well worth the little care required to protect it by setting up pine boughs about it or by tying up in a thin covering of straw or mats during the winter. It succeeds under the same treatment as the last.

Vasey's Azalea (*A. (R.) Vasey*).—A shrub 5 to 15 feet high. This is a comparatively new species, also a native of the Southern States, with beautiful light pink or rose-colored flowers appearing before or with the leaves, and thus far

has proved hardy. It promises to be a valuable addition to our list of early-blooming shrubs.

Japan Azaleas (*Rhodendron sinense* and *japonicum*), Fig. 119.—The flowers of this species are of a great variety of colors, ranging from almost pure white through various



FIG. 119.—Japanese Azalea (*Azalea mollis*).

shades of yellow and orange to that of dark orange-red. It is perfectly hardy, but rather slow in growth, attains a height of from 3 to 8 feet, and requires a moist soil and a little shelter from drying winds and hot sun.

Ghent Azaleas (*R. Gandavensis*).—The flowers of this species are very similar in colors to the last and require

about the same treatment. The flowers are fragrant in the true species.

Hercules' Club (*Aralia spinosa*).—An interesting shrub, with large compound leaves and a heavy panicle of white flowers coming in early August. It has the habit of producing suckers that, if left to themselves, are not desirable, but by pulling up such as are not wanted those remaining grow luxuriantly and the mass is kept in a satisfactory condition. It succeeds best in a somewhat sheltered, warm, but rich soil. Its tendency to produce tall unbranched shoots may be overcome by pinching the ends when 2 or 3 feet high.

Japanese Aralia (*A. chinensis*).—This species resembles the last very much, but with rather smaller and finer leaves, requiring the same treatment.

American Barberry (*Berberis vulgaris*).—This beautiful shrub is common throughout the Eastern and Northern States, and were it less common would be more prized as an ornamental shrub. It grows with little care and no shrub is more beautiful, with its golden drooping clusters of flowers in June and its bright scarlet fruit in autumn and winter. It has the tendency to make a rather straggling bush, 4 to 8 feet, but may be forced to take a compact bushy form by heading back severely some of the strong new shoots on the inside when they have reached the height of 2 or 3 feet. The branches are grooved and gray in color. It makes a very desirable hedge.

Purple-leaved Barberry (*B. vulgaris*, var. *atropurpurea*).—One of the smallest purple-leaved shrubs and one of the best. It retains its dark purple color through the season better than almost any other tree or shrub, and is especially desirable to plant in the foreground of golden or light-green-leaved trees or shrubs. Its golden flowers are rather more conspicuous on the dark purple background of its leaves

than those of the common type, but the fruit is not so conspicuous. It needs frequent heading in while young to bring it into a compact bushy form.

Dwarf Barberry (*B. Thunbergii*).—A beautiful dwarf



FIG. 120.—*Calycanthus* (*Calycanthus floridus*).

shrub from Japan, growing not more than 3 feet high, and taking a broad compact form. The branches are spreading, deeply grooved, brown, with single spines. Its leaves are small and numerous, changing to a beautiful orange and red color in the autumn, and the fruit, about the same size as the native species, is borne singly along the under side of the

drooping branches. It is especially desirable for low hedges, lines, or borders. It endures partial shade and is not eaten by browsing animals.



FIG. 121.—Sweet Pepper-bush (*Clethra alnifolia*).

Calycanthus, Sweet-scented Shrub, Strawberry Bush, etc. (*Calycanthus floridus*), Fig. 120.—A very hardy, vigorously growing shrub with brown or chocolate-colored very sweet-scented flowers. It is easily propagated from seed, which

it produces abundantly, and grows well on almost all kinds of soil; not a showy shrub, but desirable for the fragrance of its flowers.

Sweet Pepper Bush (*Clethra alnifolia*), Fig. 121.—A very hardy native shrub, attaining a height of 3 to 10 feet, producing abundant spikes of beautiful fragrant white flowers in August. It has the habit of spreading by sucker and needs care that too many of these are not allowed to grow; otherwise the flowers will be small and less abundant. It thrives best in a rather moist, sandy or peaty soil.

Red Dogwood (*Cornus sanguinea*).—A beautiful shrub of large size and especially valuable for winter effect. The branches are bright red, and when planted in contrast with low-trained golden cornel or willow with the snow for a background very beautiful results are often obtained. A group of these shrubs in front of evergreens also gives a good contrast. The fruits are black.

Variegated-leaved Dogwood (*C. alba*).—The leaves of this shrub are most beautifully variegated with yellow, white, and green, and make pleasing contrasts with dark-green or purple-leaved shrubs. The branches are of the same color as those of the last. There are also variegated forms of other cultivated species.

Purple-leaved Filbert (*Corylus Avellana*, var. *atropurpurea*).—This shrub has the darkest foliage of any of its size that I am acquainted with. When it first unfolds it is almost black, but it soon changes to a rich bronze green. It is one of the best for planting in contrast with the golden-leaved elder, golden spiræa, the variegated dogwood, or other shrubs with bright-colored foliage. It should not be forced to grow too rapidly while young, as it is not quite hardy in the extreme Northern States. I know of no specimen of this shrub living that is now more than 10 years old. A purple form of the common native hazelnut, *C. Ameri-*

cana, has recently been discovered by the author but has not been put on the market. From its hardiness, ease of growth, and beautiful foliage it promises to be one of the



FIG. 122.—Japan Quince (*Cydonia Japonica*).

best purple-leaved shrubs, as it will grow on every kind of soil and keeps its low form of growth.

Japan Quince (*Chaenomeles japonica*), Fig. 122.—One of the most hardy and vigorous of the imported shrubs. The flowers are mostly scarlet, but there are varieties in many shades of red and pink to pure white, and as they open

before the leaves unfold they produce very brilliant effects. Its tough, hard growth makes it valuable for low hedges, which are very ornamental when in blossom. It is difficult to transplant if more than two or three years old from seed or cuttings.

Daphne (*Daphne Mezereum*).—This is the earliest bloomer of all hardy flowering shrubs, and its close clusters of dull pink flowers, appearing much before the leaves, though not very large or showy, are fragrant and very pretty harbingers of spring. Attains a height of 4 feet and there are yellow and white flowered varieties.

Double-flowered Deutzia (*Deutzia crenata*, fl. pl.).—A tall, upright-growing shrub with dark green leaves and pendent racemes of pink or white flowers. It tends to grow with few lower branches, and some of the inside canes need cutting out occasionally to give it a branching condition. If forced into too much growth it is often winter-killed.

Slender Deutzia (*D. gracilis*).—One of the most beautiful of small shrubs with delicate white flowers in abundant racemes. Like the last, it should be grown rather slowly or it will be injured during the winter. A slight protection of pine boughs or straw will improve the size and quantity of the flowers.

Rose-flowered Weigela (*Diervilla florida*, Fig. 123).—This shrub grows about six feet high with showy light pink, rose or white flowers. While young, this beautiful shrub is very satisfactory, but after a few years' growth it becomes irregular in outline. To overcome this tendency some of the old wood should be cut out each year after flowering, which will result in the growth of young vigorous shoots that will produce an abundance of large flowers.

Variegated-leaved Weigela (*Diervilla nana*, *variegata*).—The leaves of this variety are beautifully marked with

white, yellow, and light green; not so rapid in growth as the last and the flowers are of a lighter color.



FIG. 123.—Weigela (*Diervilla florida*).

Several other species and varieties are offered by the nurserymen, but none of them is more valuable than the above.

Silver-thorn or Oleaster (*Eleagnus multiflora*).—A comparatively new ornamental shrub with yellowish-white fragrant flowers in April or May, and fruit of a bright red color which is very ornamental. It ripens in July and August



FIG. 124.—*Exochorda Racemosa*.

and hangs a long time on the bushes. It is almost perfectly hardy, easily transplanted, succeeds in almost any soil, and attains a height of six feet.

Burning Bush or *Euonymus atropurpurea*.—A tall-growing native shrub or small tree with rich dark green foliage and a showy fruit, the outer part of which is crimson while

the inner part is scarlet. This fruit hangs upon the bush nearly all winter unless eaten by birds.

Corky-barked Burning Bush (*E. alata*).—More compact and bushy than the last and with a richer foliage, but does not produce so much fruit. The branches have 2 to 4 broad corky wings.

Pearl Bush, *Exochorda* (*Exochorda racemosa*), Fig.



FIG. 125.—Golden-bell (*Forsythia suspensa*).

124.—One of the best of the recently introduced shrubs. Attains a height of 5 to 8 feet. The foliage is of a glaucous-green color and the flowers are single, pure dazzling white, and borne in large clusters and masses. It is hardy, very showy, and free from disease and insects.

Golden-bell (*Forsythia viridissima*).—The brightest and most attractive of the very early flowering shrubs. The flowers are of the brightest yellow and produced all

over the young branches. The shoots are perfectly hardy, but in seasons when the peach-buds are destroyed by cold the flower-buds suffer at the North and fail to produce flowers.

Fortune's Golden-bell (*F. suspensa* var. *Fortunei*).—An upright compact shrub producing more abundant and larger flowers than the last.

Weeping Golden-bell (*F. suspensa*), Fig. 125.—Is pendent or weeping in habit and with very abundant flowers. In many places where a drooping growth is desired this is much superior to the other species. Planted on the top of a bank wall the drooping branches cover the walls with beautiful effect.

Silver-bell or Snowdrop Tree (*Halesia carolina*).—A beautiful shrub producing pure white bell-shaped flowers much like the snowdrop, whence its name.

Rose of Sharon (*Hibiscus syriacus*).—This shrub, while not perfectly hardy north of New York city, is valuable on account of its large showy flowers, which open in August and September. If grown slowly in the border or lawn, it lives to considerable age and makes a very large shrub or small tree 6 to 12 feet high. The flowers vary in color from pure white to the darkest crimson and blue-purple. There are many beautiful varieties of striped or mixed colors as well as double flowers.

Japanese Hydrangea (*Hydrangea paniculata*, var. *grandiflora*), Fig. 126.—Of the many beautiful shrubs introduced from Japan this is one of the best, most easily grown, and largely planted. The flowers, coming in August and September, are very large and showy and last a long time. If gathered at just the right stage of growth the flowers retain their beauty and freshness for a long time and make desirable inside decorations during the winter. To get the best results in growing this shrub, the new growth should be

cut back severely in the fall or before growth begins in the spring, in many cases to two or three buds to each branch



FIG. 126.—A Hedge of Hardy Hydrangeas.

only, for the smaller the number of buds allowed to grow the stronger the shoots, and the size of the panicles will be

in proportion to the vigor of these shoots. The original form of this shrub, when there are only a few sterile flowers, is rather more beautiful but not quite so showy.

Pterostyrax (*Pterostyrax hispida*), Fig. 127.—One of the



FIG. 127.—*Pterostyrax* (*Pterostyrax hispida*).

most beautiful large flowering shrubs. It requires a deep, rather light soil and a little shelter. Should be more generally planted than it now is.

Shrubby St. John's-wort (*Hypericum aureum*).—One of the most beautiful of the low flowering shrubs, the flowers

being like little tassels of gold and the foliage of a rich glaucous green. It is not, however, a long-lived shrub, requiring considerable petting after five or six years of growth.

Tartarian Honeysuckle (*Lonicera tartarica*).—Some of the more brilliantly colored flowered varieties of this species



FIG. 128.—Mock-orange, Large-flowered (*Philadelphus grandiflorus*).

are very desirable. It makes a very large upright shrub, the flowers ranging from red, through pink or yellow to white, followed by bright scarlet or yellow berries.

Mock Orange (*Philadelphus coronarius*).—Often called the syringa, but as this is the Latin name of the lilac it cannot be properly applied to this plant. It is well called the mock-orange, for its flowers somewhat



FIG. 129.—White Fringe (*Chionanthus virginica*).

resemble the orange-blossom, and are equally fragrant, though with not so delicate a perfume. It grows to a large size, but retains its regular rounded bush form even when of great age. The shrub will be greatly improved in form if now and then a large central branch is cut out.

Golden-leaved Mock Orange (*P. c.*, *var. aureus*).—Very similar in leaf and flower to the last, but of a smaller growth, and with leaves that are of a bright golden color when young, but changing to a light green during the latter part of the summer. In contrast with the purple barberry, purple hazel nut, or other similarly colored foliage-shrubs it produces most beautiful effects.

Large-flowered Mock Orange (*P. inodorus*), Fig. 128.—A shrub of large, coarse growth, producing conspicuous single, white, non-odorous flowers the last of June.

White Fringe (*Chionanthus virginica*), Fig. 129.—One of the most beautiful of our flowering shrubs, with its somewhat stiff upright branches fringed with lace-like white flowers. Its blossoms last but a short time, but the heavy dark-green foliage is ornamental all summer. If planted in too rich soil it is sometimes winter-killed, and should be grown rather slowly to cause a more thorough ripening of the wood.

Purple Fringe or Smoke Bush (*Rhus Cotinus*), Fig. 130.—The beautiful mass of filaments produced about the flowers and fruit of this plant, often called “smoke” or “mist,” is a most conspicuous and beautiful object in well-grown specimens on the lawn or in the garden. To succeed best it must be grown slowly; if forced into a rapid growth in a rich border it is likely to be injured by cold and soon die, while if grown more slowly in the lawn it often reaches a large size, when it becomes a most beautiful object.

Cut-leaved Sumac (*R. glabra*, *var. laciniata*).—This is a cut-leaved form of our native smooth sumac. It takes

a rather straggling form and needs full exposure to make it grow stocky and erect. It has one objectionable feature common to all of the native species of sumacs,—that of



FIG. 130.—Purple Fringe (*Rhus Cotinus*).

throwing up suckers from the roots, and often at considerable distance from the original shrub,—but this objection can be easily overcome by pulling up the suckers (never cut them off at the surface), and putting all fertilizers or manures close up to the center of the shrub. Its beautiful



FIG. 131.—Stag-Horn Sumac (*Rhus. typhina*).

fern-like leaves that color so brilliantly in the autumn make it well worth all the care required to keep it in good form and within desired limits.

Staghorn Sumac (*R. typhina*), Fig. 131.—This species and other native species possess great beauty in leaf, flowers and fruit, but they spread so much from the roots that it is difficult to keep them within desired limits. This condition may be overcome in a measure by applying fertilizing material only in the center of the space occupied by them; cutting down through the roots with a spade will cause buds to grow where desired.

Japan Sumac (*R. semialata*, var. *Osbeckii*).—A very large, strong-growing shrub or small tree, with large compound leaves changing to beautiful colors in the autumn. The panicles of flowers are very large, nearly pure white, and open very late in the summer.

Golden Elder (*Sambucus nigra*, var. *aurea*).—One of the brightest golden-colored shrubs, the leaves retaining their bright color longer than almost any other. It is, however, rather short-lived.

Red-fruited Elder (*S. pubens*).—A native shrub, ornamental both in flower and in fruit. Berries in large clusters and bright red.

Golden Spiræa (*Spiræa opulifolia*, var. *aurea*).—The largest golden-leaved shrub we have, but of rather coarse growth and the leaves soon fade to a light green. Desirable as a background for smaller shrubs of a darker color, or to plant in front of purple-leaved small trees.

Bridal-wreath Spiræa (*S. prunifolia*), Fig. 132.—One of the oldest and most hardy of the spiræas and very largely planted. This is one of the tall spiræas and it produces long, slender branches that in the spring are covered with beautiful white double flowers. These branches may be bent around so as to form a very perfect wreath, whence the name. It

has an upright habit of growth, producing very few lateral branches, so that severe pruning should be given to a few of the strongest canes after blooming in the spring. Never prune the spiræas in the fall, winter or spring before blooming if an abundance of flowers is desired. Like all the



FIG. 132.—Bridal wreath (*Spiraea prunifolia*)

other species of this genus, the flowers last but a short time.

Lobed-leaved Spiræa (*S. trilobaota*).—A dwarf grower, 4 feet high, with slender branches, producing large masses of white flowers.

Bumald's Spiræa (*S. Bumalda*).—A dwarf shrub, rarely



FIG. 133.—Van Houtte's Spiraea (*Spiraea Van Houttei*).

exceeding two feet, with large quantities of rose-colored flowers.



FIG. 134.—Common Lilac, Tree-shaped (*Syringa vulgaris*).

Thunberg's Spiræa (*S. Thunbergii*).—The most graceful and beautiful of the spiræa while young. The flowers

are pure white. The foliage is fine and fern-like, and changes to a beautiful golden-orange color late in the autumn. It attains a height of 5 feet, but needs cutting back severely to cause the lower branches to grow with vigor. Taking out here and there a large branch down to the ground will strengthen those remaining and make the shrubs more bushy and compact.

Van Houtte's Spiræa (*S. Van Houttei*), Fig. 133.—The finest of all the spiræas and quite hardy. It is dwarf in habit, 5-7 feet high, with graceful pendulous branches that, when in bloom, are weighted down with pure white blossoms. The flowers are of very short duration, but the foliage is good.

Waterer's Spiræa (*S. Bumalda*, var. *Anthony Waterer*).—Resembling the Bumalda, but with the most beautiful large clusters of pink flowers, and continues to bloom throughout the summer more or less if the clusters are cut off before the seed-vessels mature.

Snowberry (*Symphoricarpus racemosus*).—A very pretty old-fashioned shrub, the white berries of which are ornamental until early winter, and especially in contrast with the fruit of the closely allied species *S. vulgaris*, the Indian currant, and that of the barberry.

Common Lilac (*Syringa vulgaris*), Fig. 134.—This is a very desirable shrub because of its hardiness and the many associations connected with the old homesteads of the earlier settlers of the country. Many of the improved varieties possess more beauty than the original types and are equally hardy. Among the best are Beranger, *Cærulea superba* and *nana*, Prof. Sargent, Pres. Grévy, etc.

Persian Lilac (*S. persica*).—This lilac is of medium size, with small, bright-green leaves and large compound panicles of rather brighter flowers than the common species. It is also rather more graceful in outline than the latter

and, like it, has a great many varieties. Among the best are the white form and *Rothmagensis rubra*.

Japan Lilac (*S. japonica*).—The largest of the lilacs, making a small tree. The leaves are large, dark green, and the very large panicles of white flowers are produced in June. It has thus far proved perfectly hardy and is desirable.



FIG. 135.—Japanese Snowball (*Viburnum plicatum*)

Josikea's Lilac (*S. Josikæa*).—Another tree-like lilac, somewhat resembling the last, but producing delicate pink flowers in early June.

Downy Lilac (*L. villosa*).—A new species of a somewhat tree-like habit, with fragrant light purple flowers which change to almost white.

Cranberry-shrub (*Viburnum Opulus*).—A native shrub with numerous conspicuous sterile flowers intermixed with the fertile ones, followed by bright red or scarlet fruit that hangs on the branches nearly all winter. It is hardy and succeeds under nearly all conditions. The variety with all sterile flowers is known as the Common Snowball Bush, but this is so subject to the attack of insects that it has been discarded for the Japanese species.

Japanese Snowball (*V. tomentosum*, var. *plicatum*), Fig. 135.—The leaves of this shrub are of a bright green color and with a beautifully plicated or plaited surface; the sterile flowers are borne in large clusters, are pure white, very perfect, and much superior to those of the native snowball bush. It is difficult to transplant when of large size, but young shrubs can be transplanted with little or no difficulty.

Hairy Viburnum (*V. tomentosum*).—This has rather more beautiful and large panicles with only a few large white sterile bracts in each. It is rather more effective on the lawn than the snowball.

Roses

More people appreciate the beauty and value of the rose than that of any other flower, but comparatively few succeed in growing it to its greatest perfection. It succeeds best in a deep rich soil, rather moist and of somewhat a clayey nature. More persons fail in growing the rose from not making the soil rich enough than from any other cause.

Perhaps the best line of treatment is to spade the bed 18 to 24 inches deep, working in a layer 6 inches thick of fine rotted cow manure and leaf mould to the full depth, and every fall banking up against each plant a foot or more with coarse stable manure for protection. In the spring this manure should be spread on the surface of the bed and spaded in

4 to 6 inches deep, and if the soil is not too thin and dry a good growth and an abundance of blossoms will result.

Pruning.—In pruning the work may be done either in the fall or in March, the latter time being generally preferred. In this work the bushes should be so pruned as to obtain a limited number of the strongest canes possible. The stronger the canes the larger will be the flowers. All weak shoots should be either severely cut back or entirely removed and the strong canes headed back one-half or two-thirds, varying the treatment somewhat with the variety and the size and number of flowers required; some varieties, especially the very strong growing ones, needing less pruning than others, but with all varieties the smaller the number of shoots the larger will be the flowers.

The climbing, briar and moss roses should not be pruned except to take out old or weak canes and to remove the dead tips of shoots.

Winter Protection.—Banking up against the collar of the bushes a foot or more with soil or manure should be practised with all outdoor roses, and most of them will be much benefited by tying up in coarse rye-straw or mats. Pine boughs set up closely about them for the winter will improve the quality of the blossoms very greatly.

Varieties.—We may divide the varieties most commonly grown into bedding roses, briar roses and climbing roses. In the first group we would include the hybrid perpetual, hybrid tea, tea and dwarf polyantha roses. The briars include the rugosas, rugosa hybrids, and Persian and Austrian roses. The climbers include many climbing varieties of the classes enumerated under group one, as well as the natural climbers.

BEDDING ROSES: HYBRID PERPETUALS, Fig. 136.—American Beauty, Alfred Colomb, Anne de Diesbach, Baroness Rothschild, Captain Hayward, Clio, Frau Karl Druschki,

General Jacqueminot, La Reine, Magna Charta, Mrs. R. G. Sharman Crawford, Paul Neyron, Prince Camille de Rohan, Ulrich Brunner.

HYBRID TEAS.—Antoine Riviere, Bessie Brown, Captain Christy, Caroline Testout, General McArthur, Gloire Lyonnaise, Gruss an Teplitz, Kaiserin Augusta Victoria, Killarney, La France, Souvenir du President Carnot, Richmond, White Killarney, Viscountess Folkestone.



FIG. 136.—Bedding Roses.

DWARF POLYANTHA ROSES.—Annchen Muller, Baby Rambler, Baby Dorothy, Baby Tausendschön, Catherine Zeimet, Clothilde Soupert, Marie Pavie, Mignonette, Jessie, Orleans, and White Pet.

TEA ROSES.—Bon Silène, Bride, Bridesmaid, Catherine Mermet, Mme. Joseph Schwartz, Maman Cochet, Papa Gontier, Safrano, and White Maman Cochet. This group requires extra protection north of Philadelphia, but is ex-

ceedingly valuable for planting in California and in the South.

BRIAR ROSES.—The Persian Yellow, Austrian Copper and Harrison's Yellow belong to this group. The two forms of *ROSA RUGOSA* (white and red) and their hybrids are very



FIG. 137.—Moss Rose.

useful in landscape planting, as their foliage is more resistant to the rose pests. The rugosa itself is immune to the attacks of the leaf hopper and the saw-fly larva which are so destructive to the foliage of most roses.

CLIMBING ROSES (Fig. 139).—American Pillar, Baltimore Belle, Prairie Queen, Crimson Rambler, Dorothy Perkins,



FIG. 138.—Mixed Climbers.



FIG. 139.—Crimson Rambler.

White Dorothy, Dawson, Excelsa, Lady Gay, Tausendschön, Seven Sisters, Shower of Gold, and Yellow Rambler. In the South and in California many beautiful climbing roses which are too tender for the North are planted in place of the above. Among these are Maréchal Niel, Cloth of Gold, William Allen Richardson, Lamarque, Gloire de Dijon, *R. Banksiæ*, *T. moschata*, and *R. lævigata*.



FIG. 140.—Japanese Rose (*Rosa rugosa*).

There are other classes of roses suitable for certain positions. The Wichuriana, or Memorial rose, is usually allowed to train on the ground, where its pure white single flowers with golden yellow stamens are very effective. The moss roses (Fig. 137) were often planted in old gardens. Among the best varieties are Common Moss, Crested Moss, Princess Adelaide, and White Bath.

ROSA RUGOSA (Fig. 140) and *R. humilis* are especially valuable in landscape work for planting in shrub borders and



FIG. 141.—Climbing Rose. (Dawson.)

for covering slopes and rocky ridges. *Rosa rugosa* and *R. lucida* are desirable hedge plants. The fruits of most species of the rose are very decorative. The red stems of *Rosa lucida*, etc., are very effective in the winter landscape. The autumn foliage colors of *R. rugosa* and most of the American species are effective. The Sweetbrier or Eglantine (*R. rubiginosa*) has foliage which exhales an agreeable aromatic odor. *Rosa rubrifolia* has red foliage throughout the season.

Evergreen Shrubs

If we should omit the evergreen shrubs from our list of ornamental material, we should lose much that is most beautiful and very popular on all the best places in the country. Nothing can exceed the great beauty of the kalmias and the rhododendrons, they add so much beauty and finish to every place where used. In our climate, where the sun shines with great fierceness, they do not succeed except under conditions of some shelter from the hot sun and drying winds. Protection from the sun during winter months is especially desirable, as the alternate freezing and thawing causes damage to the foliage and flower buds. If possible, naturally protected locations should be selected, but where these are not available artificial protection during the winter must be provided by means of pine boughs, boxes, etc., set up around them. Too close covering should be avoided, as with a very close box, barrel, or close straw covering. All that is required is shelter from fierce drying winds and the burning sun during the winter. If a box is used, it should be with openings on the north or west side, to allow a free circulation of air about them. Some of the best varieties are:

Boxwood.
Laurel, Mountain.
Holly, American.

Rhododendron Maxima.
Rhododendron Catawbiense.
Andromeda.

Boxwood (*Buxus sempervirens*).—This little beautiful evergreen shrub is fast becoming extinct in the northern sections of the Middle and Eastern States, where a quarter of a century ago it was largely used for a low hedge or border or as specimen plants. It succeeds best in a rather moist, somewhat shaded place, but soon fails where planted in thin soil or a southern exposure. Where a low, formal outline is desired for edges of walks or beds, it serves a good purpose, but lacks the graceful natural beauty of the laurel or Mahonia.

Mountain-laurel (*Kalmia latifolia*), Fig. 142.—One of the most beautiful evergreen shrubs in the world, found growing wild in nearly every State east of the Rockies in hilly or mountainous regions. It succeeds best in partial shade or cool northern slopes and in rather moist soil. It is difficult to transplant, and if taken from the fields or woods only small plants must be used and these must be dug with a considerable ball of earth upon the roots. If planted in a very much exposed situation, protection of pine boughs should be given during the winter.

American Holly (*Ilex opaca*).—A native shrub with leaves and berries closely resembling the European holly. In exposed places north of Washington, D. C., the leaves turn dark brown during the winter and are often injured by the hot sun. Should be planted in shelter, shaded from the hot sun and protected during the winter with pine boughs.

Rhododendron, Great Laurel (*R. maximum*).—A native shrub found growing in shady places along the coast from Maine to Florida is being much used, and serves a good purpose if planted in the shade in rather moist, porous soil.



FIG. 142.—Mountain-laurel (*Kalmia latifolia*).

If half decayed leaves or peaty soil is used thoroughly worked into the soil and a mulch of leaves or peaty soil put on the surface during the summer each season, these shrubs will be sure to make a good growth.

Mountain-rhododendron (*R. Catawbiense hybrids*), Fig. 143.—The most showy of all of the flowering shrubs when in bloom and during the winter on account of its large dark-



FIG. 143.—Rhododendron Catawbiense.

green leaves. It succeeds best in a rather moist, fibrous soil, as described above, but does well in almost any kind if it is made porous, not too dry, and if the plants are sheltered from the burning sun during the winter. While young especially, pine boughs or some other protection should be put up around them to keep the leaves from burning and to keep off fierce drying winds.

The number of varieties offered by nurserymen is very large, but a comparatively small number of them are hardy

in northern New England. Some of the best varieties for general planting are *Album elegans*, *Everestianum*, *Superba elegans*, *Roseum elegans*, *Speciosa*, etc.

Andromeda (*Andromeda floribunda*).—A very pretty shrub, producing an abundance of white flowers in the



FIG. 144.—Rhododendron Prepared for Shipment.

early spring. Requires much the same treatment as the rhododendron.

Climbing Shrubs or Vines

Without climbing vines many beautiful homes would present a sad and unprotected picture during our hot summers. They grow quickly, cover pergolas, verandas, porticoes, porches, arbors, walls, fences, well curbs, etc., with a

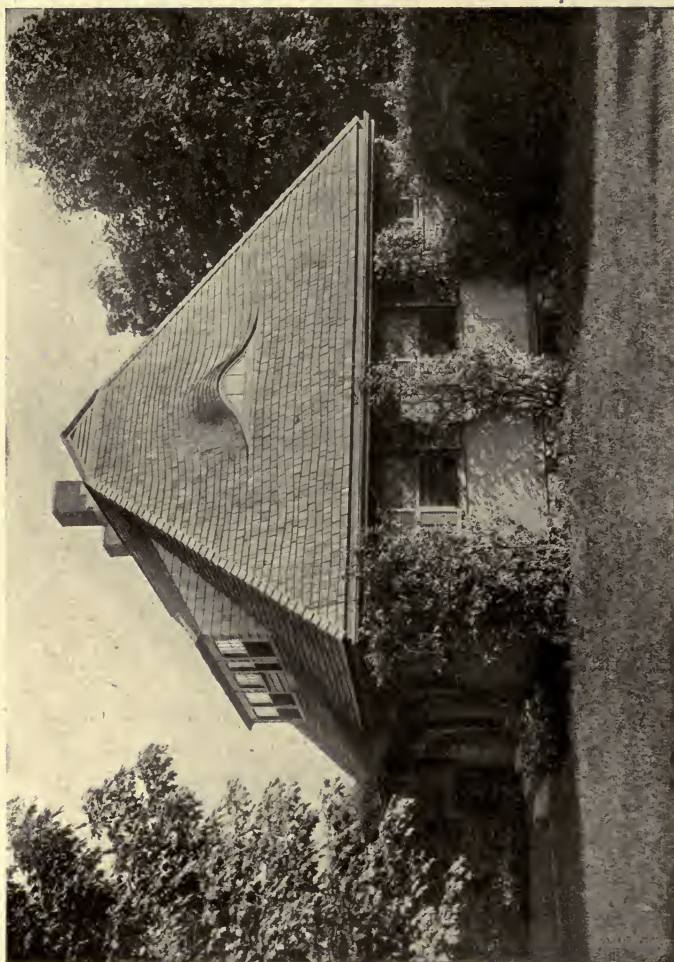


FIG. 145.—Vine-covered Cottage.



FIG. 146.—American Woodbine,

living green that is far more beautiful than any artificial structure and affording grateful shade during our hot summer days. Fig. 145 shows a vine-covered cottage in June, covered with roses, *Actinidia arguta* and *Parthenocissus quinquefolia*, with a group of ferns at the foot of the porch on the right. On the left is a large specimen of *Philadelphus coronarius*, while on the right is one of *Philadelphus grandiflora*. Among the best of this group are the following:

Woodbine, Japanese.	Honeysuckle, Japanese.
Woodbine, American.	Wistaria, Chinese.
Clematis or Virgin's-bower.	Wistaria, White.
Clematis, White.	Actinidia.
Clematis, Jackman's.	Trumpet-creeper.
Clematis, Jap, Sweet-scented.	Grape Vines.

Woodbine (*Parthenocissus quinquefolia*), Fig. 146.—This beautiful native vine is very useful for covering arbors, trellises, verandas, fences, half-dead trees, stumps, etc. It is a rapid grower, is beautiful in foliage and in fruit, especially in its autumnal tints. The fruit is the size of a pea, dark purple covered with a blue bloom. It is also free from insect or fungous attacks, but requires some support on smooth surfaces, when it reaches large size, the tendrils not being strong enough to hold up its increasing weight. Thrives in almost any soil. Exceedingly valuable for its autumn coloration.

Japanese Woodbine, Boston Ivy (*P. tricuspidata*, var. *Veitchii*), Fig. 147.—By far the finest vine we have for covering stone and brick buildings, walls, etc. It grows rapidly, clings firmly by its numerous disk-tendrils, and does not run across openings formed by doors and windows. It colors up most beautifully in the autumn and is easily propagated from seeds or cuttings. The leaves are three lobed, hence, its scientific name. It stands dust and smoke well.

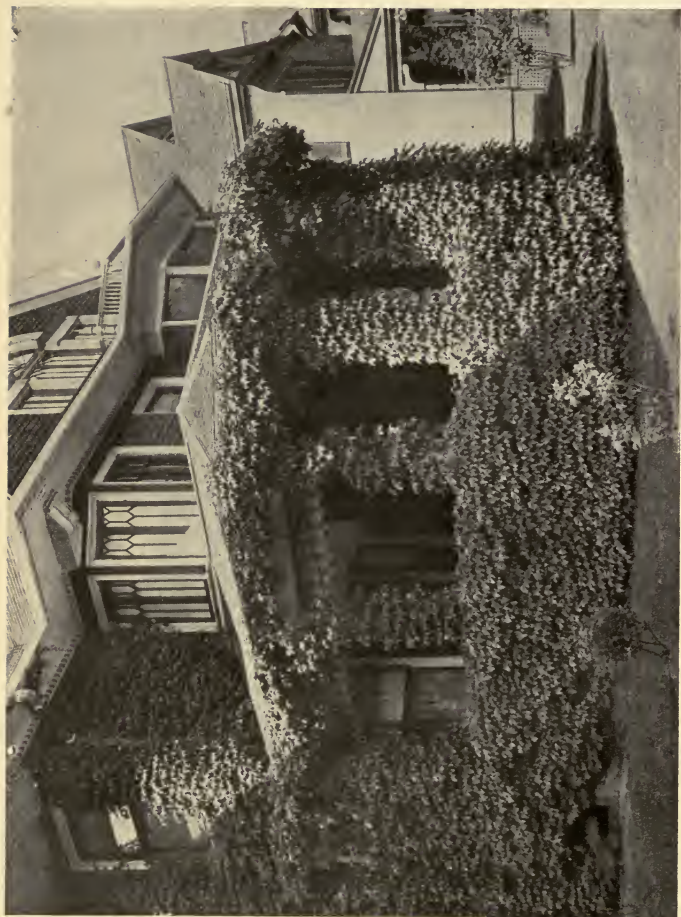


FIG. 147.— Japanese Woodbine, Boston Ivy.

Virgin's-bower (*Clematis virginiana*).—A beautiful native climbing shrub, with large clusters of white flowers in July followed in September by the beautiful tasselled fruit. Not much planted in cultivated grounds, but is worthy of cultivation in even the most pretentious places, and would be



FIG. 148.—Japanese Clematis (*Clematis paniculata*).

much more largely used were it not so common along the roadsides and fences.

Jackman's Clematis (*C. Jackmanii*), Fig. 149.—A beautiful climbing vine, but, like all of the species of the clematis, the canes are very weak and easily injured or broken. The flowers are intense violet-purple, large, and much out of proportion to the weak vine. When planted in a sheltered place with wire netting to protect it from being broken, it often grows well.

White Clematis (*C. Henryi*).—Flowers of the same size and form as the last, but pure white in color.



FIG. 149.—*Clematis Jackmanii*, and *Henryi*.

Japanese or Sweet-scented Clematis (*C. paniculata*), Fig. 148.—A rapid-growing vine, producing clusters of star-shaped sweet-scented white flowers in wonderful profusion in September. A beautiful addition to our list of late-flowering climbing plants.

Japanese Honeysuckle (*Lonicera Japonica*, var. *Halliana*), Fig. 150.—This vine has the advantage that it will “grow” under almost any condition. The flowers are



FIG. 150.—Japanese Honeysuckle (*Lonicera Japonica Halliana*).

yellow, changing to a pure white, and are fragrant and abundant from June to September. It should be trained to wire netting or some other support, for if allowed to lie on the ground every branch will take root and it becomes difficult to eradicate it, except by constant pulling and

hoeing up of all suckers not desired, which often results in injury to the main shoots. With a slight protection of



FIG. 151. Chinese Wistaria (*Wistaria sinensis*).

leaves, straw, or pine boughs, or by the vines lying on the ground, the leaves remain perfectly green nearly all winter,

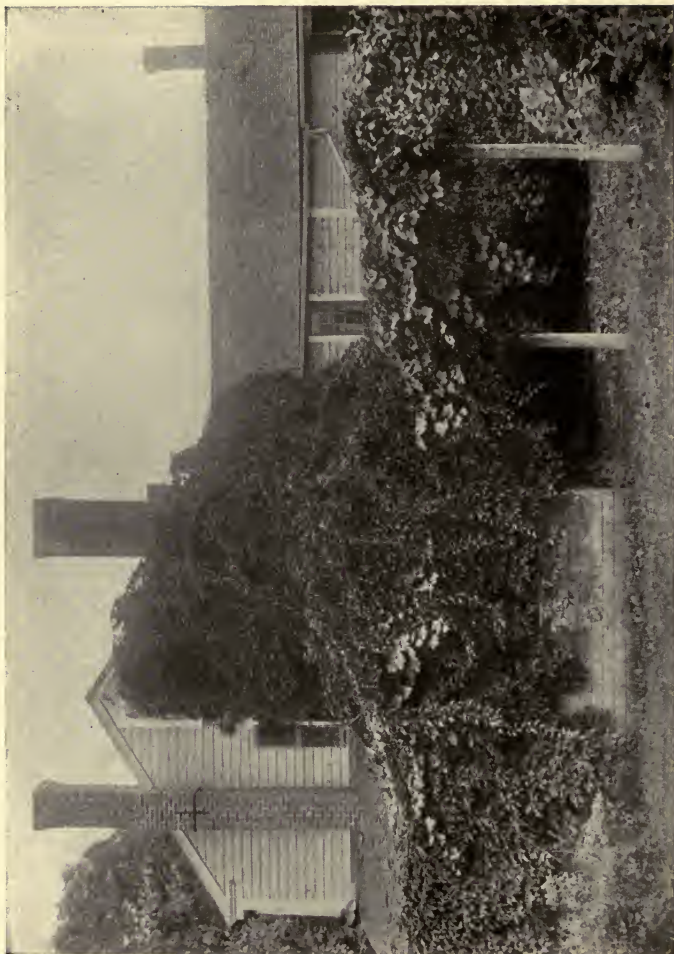


FIG. 152.—Kokwa or *Actinidia arguta*.

but in full exposure they turn brown during the latter part of winter and are anything but ornamental. This is a valuable shrub for covering dry or steep embankments which are difficult to cover with grass.

Chinese Wistaria (*Wistaria spinensis*), Fig. 151.—One of the most rapidly growing vines, producing large pendent panicles of light blue flowers in great profusion. It is one of the few vines that will twine around large supports, pillars of verandas, or arbors.

White Wistaria (*W. c.*, *var. alba*).—Like the last in growth, but producing white flowers.

Actinidia (*Actinidia arguta*), Fig. 152.—More vigorous even than the wistaria and with better foliage, but the flowers are inconspicuous. It will cover an arbor or trellis more quickly than any vine we have. Some of the vines produce a small green fruit that one soon learns to like, and makes a most delicious preserve. Native of Japan. Entirely free from any insect attack.

Another species of Silver Sweet Vine (*A. polygama*), has been introduced, resembling the last-named species, not so vigorous, but one-half of each leaf at the ends of the growing shoots changes on the upper surface to a glistening white, making it a most strikingly beautiful vine. Cats are especially fond of it, and while young, protection of wire netting needs to be put up around to keep them from tearing the vines in pieces.

Bitter Sweet (*Celastrus scandens*).—A most beautiful vine with inconspicuous fragrant flowers which are followed in the autumn by clusters of bright orange berries like fruits which when mature burst open and expose bright pink inner seeds. It is subject to the attack of a large scale-like aphid which often so weakens the vine as to make it of little value. Spraying with a weak solution of lime sulphur in July will destroy most of these pests.

Trumpet-creeper (*Campsis radicans*).—Where hardy, this is a very beautiful and satisfactory climber, though it will not hold itself to the walls of buildings and trellis-supports as well as many others. North of 42° of latitude it must be protected during the winter with some light, airy covering or be grown slowly in grass borders. The trumpet-shaped flowers of a deep orange red are borne



FIG. 153.—Grapevine Covering Old Stable.

in large clusters and form very pleasing contrasts with the dark green foliage.

Grape Vines (*Vitis sp.*), Fig. 153.—For covering arbors, pergolas, verandas, porches, stone walls, ledges or trained to a trellis for a screen, etc., there is nothing more satisfactory than grape vines, and the fruit, if the vines are properly trained, may be of considerable value. The varieties best suited for this work are Concord, Delaware, Brighton, Diamond, etc.



Fig. 154.—Combined Useful and Ornamental. Part of Fig. 78.

For the best results they need be planted on a southern exposure in a well-drained soil, and be carefully trimmed each season—at any time from December to March. They should be trained to some support that will carry the vine a little away from the building or other object to be covered. The best method of training when used for a cover is the single-cane system, where strong new canes—those of last season's growth—are spread over the surface to be covered at sufficient distance apart to cover the surface as much as desired and for the full development of the fruit. All other canes, especially those of two or more years old to be cut away entirely. After the vines have become established the pruning needed each season will be cutting off of the last season's fruiting canes in the winter and bringing into their place strong new canes.

English Ivy (*Hedera helix*).—On brick or stone walls and sides of stone buildings with a northerly exposure the common English ivy is very beautiful and satisfactory. It is easily increased by laying down vigorous shoots, upon which there are already formed air roots, and covering them with 2 or 3 inches of soil. Many variations of leaves have been produced from the original type, some large and light in color, others very dark and small and some with variegations of yellow, white and pink.

Hedge-plants *

Hedge-plants are used for two purposes, i.e., to serve as a boundary-line that shall be more natural and ornamental than a stone wall or fence, and as a protection from animal or other trespassers; and if either of these is a necessity a well-kept hedge serves a very good purpose, though there are few, if any, places where the fence, wall or hedge even

* For treatment of hedges, see page 80.

can add much to naturally beautiful surroundings. Among the best trees and shrubs for this purpose are the following:

Locust, Honey.	Privet.
Arbor-vitæ, Siberian.	Buckthorn.
Hemlock.	Barberry, Common.
Boxwood.	Barberry, Purple.
Quince, Japanese.	Barberry, Japanese (<i>B. Thunbergii</i>)
Rose, Japanese.	

Siberian Arbor-vitæ (*Thuja occidentalis*, var. *Siberica*).—Already described under “Evergreen Trees.”

Hemlock (*Tsuga canadensis*).—Must be planted in a deep, cool soil with some protection from hot sun and extreme cold northwest winds.

Boxwood (*Buxus sempervirens*).—Described under “Evergreen Shrubs.” Desirable for a small, low hedge or border.

Japan Quince (*Cydonia japonica*), Fig. 122, page 222.—One of the most rapidly growing and hardy of our shrubs and especially valuable for hedges. It requires considerable care to keep it in perfect form and should be severely headed in at planting to make it throw up numerous shoots at the base, without which a good hedge cannot be made. It is not a shrub that will bear as close pruning as some others, but if allowed to take a natural bushy form it is very beautiful in flower and has a rich dark-green foliage.

Honey-locust (*Gleditchia triacanthos*).—None of our deciduous trees makes a hedge that is sure to turn animals or the small boy so effectually as this, when properly treated. As with most trees or large-growing shrubs, severe pruning is required to give them the strong growth of numerous branches at the base, and then each succeeding year if it be cut back from four to six inches longer than the last year it soon forms a dense mass of strong shoots near the ground.

The numerous branching spines along the trunk and main branches make it the best guard plant we have.

Japan Rose (*Rosa multiflora*).—This very strong-growing rose promises to become a valuable hedge-plant. On account of its vigor of growth and the numerous spines it will turn animals, fruit-thieves, or other trespassers, and is ornamental in flower and fruit. In habit of growth it is compact, thrives in very poor soil, and as yet has never been injured by cold in the vicinity of Amherst and other northern sections of Massachusetts.

Privet (*Ligustrum vulgare*).—A neat, compact shrub, that stands pruning perhaps quite as well as anything we have. The same treatment as given for the Japan quinces and other hedge-plants is needed as to early formation of lateral branches. Old hedges of this species that have lost their lower branches or that have grown many years at the top only may be renovated by cutting down to within 6 to 10 inches of the ground in the spring before growth begins, when numerous new, strong shoots will come out from the stubs and soon a new and well-formed hedge will result. Each year some of the old wood must be cut out and new canes cut back into the middle of the hedge. During the summer the strong new canes that grow beyond the outline desired should be shortened to this point.

California Privet (*L. ovalifolium*), Fig. 155.—One of the most popular hedge plants, of a bright-green color and that stands pruning remarkably well. Occasionally it is reported to be injured by winter, but this is probably only where grown too rapidly.

Buckthorn (*Rhamnus cathartica*).—Somewhat resembling the last in habit of growth, is hardy and tough, and stands shearing well.

Common Barberry (*Berberis vulgaris*).—This may be used as an ornamental hedge and when grown of large size

becomes protective. The more strong branches that can be secured at the start of the hedge the better. Close pruning will not give as good results with this species as the more natural growth of the bush obtained by cutting out here and there a cane to correct the form of each shrub and to cause it to thicken up and branch low.



FIG. 155.—California Privet Hedge, Closely Pruned.

Purple Barberry (*B. v.*, *var. purpurea*).—This was fully described under “Ornamental Shrubs.” Not quite so vigorous as the last, nor does it make quite so fine a hedge, though the purple foliage and the golden pendent blossoms are very beautiful.

Japanese Barberry (*B. Thunbergii*), Fig. 156.—One of the most beautiful of our small shrubs. It is especially fine when

allowed to grow in its most natural form, making a compact, yet light, graceful bush or hedge of from 2 to 3 feet high. By cutting out here and there during the summer strong shoots that tend to grow beyond the outline desired, it is kept in a low natural compact form. Its foliage is small but abundant, of a light-green color, changing late in the fall to a bright orange red. The fruit is larger than that of the other species described, borne singly, pendent on the



FIG. 156.—Unpruned Barberry Hedge.

under side of the numerous small branches and hangs for a long time after the leaves have fallen—nearly all winter unless eaten by birds.

Tender Hydrangea (*Hydrangea opuloides* vars.).—This species is largely used for veranda and lawn decoration. Its immense, rounded panicles of flowers, white when they first open, change to shades of pink and violet-purple under varying conditions of soil and exposure. They may be kept over winter in a warm, dry cellar, giving them just



FIG. 157.—Home with Vines on Veranda and Hardy Herbaceous Plants in Foreground.

water enough to keep the branches from becoming shriveled. The time for bringing them from the cellar and starting into growth may vary according to the time they are desired in bloom. For early blooming the last of March, and for July and August blooming they need not be started into growth until May.

Flowering Hedges.— Spireas, hydrangeas, lilacs, roses, and many other flowering shrubs may be used for hedges, and often very pleasing results be obtained. To make the best show, they should be planted at sufficient distance to give each plant full development, and they should be encouraged to make numerous branches at the base. The different species of shrubs will require somewhat different treatment as to pruning to produce the largest show of blossoms. (See Pruning Hedges and Shrubs, pages 84 and 88.) They may be made of one kind, as the hydrangeas, lilacs, spiræas, etc., or many species may be planted together. The largest should be planted in the middle of the group or in the rear of the border when the hedge is made of considerable width. The advantage of the mixed grouping is that something may be had in bloom at nearly all seasons of the year, but it will be almost impossible to make as even and true outline as with shrubs of one kind.

CHAPTER XIII

HERBACEOUS PLANTS

LONG lists of hardy herbaceous plants are given in the catalogues of many nurserymen, and a large proportion of the species and varieties advertised are valuable under proper conditions of soil, exposure and care, but the majority will not give satisfaction under ordinary treatment given by the average amateur. In the following pages are mentioned only those that are most desirable and easily grown.

Anemone, Japanese (*Anemone japonica*).—This is the finest of all fall-blooming herbaceous plants for the mixed border. The plant is stately in habit, 2 to 4 feet high, with branching stems which are clothed with large, showy, white, deep red or rose-colored flowers from September to November. A rich soil is required.

Aster. Starwort, Michaelmas Daisy.—Many species of our native asters are very beautiful and, given proper conditions, succeed in cultivation. Under the shade of avenue or street trees or similar shaded situations, *Aster cordifolius* and *A. undulatus* grow beautifully in the Northern States. Other species, as *A. ericoides*, grow in dry and exposed places; while others, like *A. novæ-angliæ* and *A. novæ-belgii*, prefer a moist soil. *Aster laevis* grows best in good soil in full sun or partial shade. It will be seen, therefore, that these plants are adapted to various positions on the home grounds. They are very effective when massed in the flower border or in wild garden. Most of them are improved in habit in cultivation. The English call these

plants Michaelmas Daisies, and have originated numerous improved varieties which deserve to be better known in America. The latter are propagated by division of the clumps, although the species grow readily from seed.

Bleeding Heart (*Dicentra spectabilis*).—This plant is common in all old gardens. It is a lovely plant, growing 1 or 2 feet high, and is very striking when covered with a large number of heart-shaped, rosy-red flowers. It blooms in late spring.

The native species, Squirrel Corn (*D. canadensis*) and Dutchman's Breeches (*D. cucullaria*), are dainty spring flowers. These may be taken from the woods, and if natural conditions of shade and light soil are given, are satisfactory border plants.

Bloodroot (*Sanguinaria canadensis*).—A very common and most beautiful native plant, producing its showy, pure white flowers very early in the spring. It grows in moist, shady situations and is easily transplanted to the garden where, if similar conditions are given, it succeeds. The very early blossoms are followed by broad, lobed, glaucous leaves which retain their beauty most of the summer.

Boltonia. False Chamomile.—The Boltonias are tall, leafy plants, blooming in late summer and autumn. The flowers are aster-like. They are of the easiest culture and care for themselves when established. *B. asteroides* has flowers with rays white, violet and purple. *B. latisquama* is a handsomer plant with larger and more showy flowers of velvety blue.

Chrysanthemum.—The hardy chrysanthemums have long been cultivated, and there are a considerable number of varieties. They are generally known as pompons and are supposed to belong to the same species as the greenhouse chrysanthemums which, however, are tender outdoors in the Northern States. South of New York the hardy chrys-

anthemums are among the best very late-flowering perennials. In the North their hardiness is often uncertain.

Columbine (*Aquilegia vulgaris*, etc.).—The Columbines are showy spring and early summer-flowering plants. They vary from white to deep blue in color, and double



FIG. 158.—White Day Lily (*Hosta plantaginea Grandiflora*).

flowers are common. Columbines are easily grown, and although the plants are not of long duration, it is not difficult to grow seedlings every two or three years to renew the stock. In addition to the varieties of common garden Columbine (*A. vulgaris*), many of the species are well worth growing. The Rocky Mountain Yellow (*A. chrysantha*) and the blue (*A. cœrulea*) succeed well in any good moist garden soil. The various species and

varieties hybridize freely, so that it is difficult to secure pure seed of any of the garden forms except from wild plants. The different species vary from 1 to 4 feet in height.

Coreopsis (*C. lanceolata*).—A showy, yellow-flowering hardy perennial, of easy culture in any garden soil. The flowers, which are $1\frac{1}{2}$ to $2\frac{1}{2}$ inches in diameter, are produced on long stems, making them suitable for cut-flowers.

Day Lilies (*Hosta*), Fig. 158.—The blue or white-flowering day lilies belong to the genus *Hosta*. They are hardy summer-flowering plants, of easy culture in deep rich soil. The broader leaved kinds grow vigorously in moist, shady places. Many varieties have strikingly variegated leaves. The *Hostas* are propagated by dividing the clumps. Some species produce seed freely which should sown as soon as ripe. Sometimes known as Plantain Lily.

Day Lilies, Yellow and Orange Flowered (*Hemerocallis*).—The old garden flower is found in many gardens. The plant has narrow, grass-like foliage, whereas the *Hostas* have broad foliage. The plants are remarkably free from insect or other pests, and are perfectly hardy without any protection. The roots are fleshy, and the plant thrives in almost any garden soil, but succeeds best in moist situations and in partial shade. It is an excellent plant around the margin of ponds.

The genus includes the Lemon Lily (*H. flava*), one of the finest perennials, and the Brown Day Lily (*H. fulva*), common in every old garden.

Fraxinella or Gas Plant (*Dictamnus albus* Linn.).—A very hardy old garden plant producing large terminal racemes of flowers. There are two forms, the pink and the white flowered. The plant is of sturdy, bold, upright growth, attaining a height of 3 feet. A strong, heavy, moderately rich soil suits them best. They are not fastidious as to situation, succeeding in full sun and in partial

shade. A splendid plant for the border, but must not be disturbed very often. Easily propagated by seeds sown in open ground as soon as ripe. When seedlings are two years old they may be transferred to the border. It is called the gas plant because of an explosion which occurs when a lighted match or lamp is held close up to the open flowers. This was supposed to be an explosion of gas, but close investigation has shown that it is the result of the combustion of an easily ignited wax secreted in the petals.

Gaillardia (*Gaillardia aristata* vars.).—This genus is notable for the profusion and duration of its flowers, which appear in constant succession all summer and autumn. The flowers are large and showy, adding to the gorgeous effect of the flower border. They thrive in a light, well-drained soil, in a sunny exposure. The plants winter-kill on heavy moisture-laden soils. Gaillardias are propagated usually from seed sown in cold frames in August or September, or in early spring under glass. The improved varieties do not reproduce themselves from seed, but are multiplied by division or by root cuttings.

Golden Marguerite (*Anthemis tinctoria*).—An excellent hardy border plant, thriving in almost any soil if planted in full exposure to the sun. Plants of bushy habit, 2 to 3 feet, with much divided leaves and large daisy-like golden-yellow or pale yellow flowers.

Hollyhock (*Althaea rosea*).—This tall, stately plant was a favorite in old gardens, but the ravages of the rust have caused many persons to discard it. Its excellence for mass effects and for breaking the sky line in flower borders is altogether too well known, however, for it to wholly disappear. Seed from vigorous, healthy plants grown without check in good soil will probably escape the disease unless diseased plants in the near vicinity are allowed to remain. Spraying thoroughly both sides of the leaves of healthy

plants with Bordeaux mixture will provide additional protection.

The flowers are single and double. The colors are white, various shades of red and yellow.



FIG. 159.—Japanese Iris (*Iris laevigata*).

Irises.—There are two groups of the Irises which are important for the American planter, the Japanese group and the German group. The Japanese Iris (*Iris laevigata*, or *I. Kämpferi*), Fig. 159, forms strong clumps 2 to 3

feet high, producing several flower stems. The leaves are slender and erect. The flowers of the cultivated varieties have a flat expanded form which distinguishes this group. The colors range from white through all the shades of blue to deep purple. Their blooming season



FIG. 160.—German Iris.

follows that of the Germanica group and lasts until the end of July. All varieties are hardy and thrive in moist, cool situations. They are used along margins of streams.

The German Irises (Fig. 160) comprise a number of species and hybrids which have given a large number of garden varieties. These vary much in stature and in size and color of the flowers. The latter are large (often 6

inches across) and handsome, ranging from white, mauve, shades of blue to deepest purple and including yellow. The flowers exhibit beautiful variegation and shades of color. The flowers are produced on tall, stout, erect stems above the clumps of spreading leaves. The leaves are heavier and more glaucous than the Japanese.

There are many other species and varieties of Iris that are desirable in a collection, but none superior to those mentioned. The dwarf Irises (*I. pumila*, etc.) are desirable because they seldom grow over 9 inches in height, which adapts them for edges of borders. The European dwarf (*I. pumila*) belongs to the same sub-genus as the German Irises and succeeds under like conditions. The flowers appear very early. The American dwarf species are even smaller than the foregoing and worth growing. All of the Irises mentioned have rhizomatous roots which are divided to secure an increase of the desirable varieties. The best time to transplant rhizomatous Irises is immediately after flowering. This enables the plants to become established before winter. They succeed in most, well-drained soils which would not be called wet. The latter soils are suited for growing the Japanese and similar species.

Larkspur (*Delphinium*).—The larkspurs are desirable garden plants because of their vivid blue shades. In fact, they cannot be dispensed with if a good color scheme in the garden or hardy border is desired. Among the best perennial species are *D. formosum*, *D. hybridum* and *D. grandiflorum*, all of which are prolific in garden forms. Larkspurs grow well in almost any good loamy soil, but the tall forms and named varieties should have a deeply prepared, rich soil. The tall varieties require stakes, as they break down easily. The named varieties are often expensive, but excellent varieties can be obtained from seed sown in autumn or early spring. The plants will bloom the second season. Old

plants divide readily, and the finest kinds may be increased by this method.

Lilies.—No place is complete without some of the species of this queen of flowers. Some of them are very easily grown and give great satisfaction. While a variety of soils and conditions are required to grow a collection of lilies, the majority of them succeed only on a light soil of sand and gravel mixed, since this soil is free from excess moisture. The soil should be rich, but no manure must come in contact with the bulbs. Manures are best applied to the surface as a mulch. Lilies should be planted deep, owing to the fact that many produce roots along the stem above the bulb, and also because deep planting enables them to withstand drought and keeps the roots cooler. A mulch of 3 or 4 inches of leaf mold or peat is excellent for the latter purpose. Peat mixed with the soil in its preparation adds to its moisture-holding capacity and enables the plants to better withstand drought. A position should be chosen which is sheltered from severe winds and the midday sun, but this does not mean the close vicinity of trees. Among rhododendrons is a good place for some lilies, and sometimes they are used among peonies. The bulbs should not be severely frozen in winter, which can be prevented by adding sufficient mulch. It will be found advantageous to take up and separate the bulbs of the lily bed every three or four years, and after renewing the soil replant the largest and strongest bulbs. Among the best kinds are:

GOLD-BANDED LILY (*L. auratum*), Fig. 161:—This is the finest of all the Japan lilies. The flowers are large, white, spotted with dark crimson, and with a golden line or band along the center of each petal. The flowers often grow in large clusters, as many as forty sometimes appearing on a single stalk, but the ordinary number is about six to ten. Height 2 to 4 feet. There are several garden varieties.

This lily is planted in large quantities in American gardens, but it does not thrive indefinitely as certain species do. In ordinary gardens new stock usually must be procured every two or three years.

LANCE-LEAVED LILY (*L. speciosum*).—This is probably the best species for general cultivation, as it is more thrifty and



FIG. 161.—Golden-banded Lily (*Lilium auratum*).

hardy than the preceding. The habit is also less formal. The flowers are of somewhat the same type and markings except that they lack the gold-band characteristic of *L. auratum*. The two varieties, *album* and *rubrum*, are distinct and desirable.

MADONNA LILY (*L. candidum*).—This is probably the best white lily for garden culture. It is an old favorite, but of

late years has been subject to a disease called by some the lily blight. Bordeaux mixture has been successfully used as a preventive. This species should be planted in August.

EASTER LILY (*L. longiflorum*).—This lily and its great variety, the Bermuda Easter Lily (*L. Harrisii*), are extensively used by florists for forcing. The bulbs are produced in Japan, Formosa and Bermuda, and are sent in large quantities to the United States.

TURK'S CAP LILY (*L. superbum*).—This is one of the finest of all lilies in size and vigor of growth of plant, often reaching 6 feet in height. It succeeds best in a rather moist soil. The flowers are six to twelve in number, bright reddish orange and conspicuously spotted, with recurving petals. One of the species which often succeeds in a heavy soil and frequently in considerable shade. A very useful lily in borders. It is native of the eastern United States. It should be called American Turk's Cap Lily to distinguish it from *L. martagon*, which is commonly cultivated in Europe.

TIGER LILY (*L. tigrinum*).—This old-fashioned flower is one of the best lilies for massing, and it thrives year after year in the open border. It often succeeds on heavy soils. The flowers are three to ten or more in a raceme. The color is deep orange, thickly spotted with purplish-black. Height 2 to 5 feet. The variety *splendens* is more vigorous than the type. This lily may be propagated by planting the bulblets produced in the axils of the leaves. These with good care will bloom in three or four years.

BATMANN'S LILY (*L. elegans*, var. *fulgens*).—This lily is of dwarfer growth than the preceding, and is therefore adapted for bedding. There are a number of varieties giving a considerable range of color. While it thrives on a variety of soils, it succeeds best on one of a light character.

There are many other lilies, as *L. Chalcedonicum*, *testaceum*, *maculatum*, *Henryi*, *Martagon*, *monadelphum* and *Canadense*.

All succeed in light soils, although the last may do well on a heavy one. The cultural requirements and region of adaptation of many of the lilies are unknown in this country. It may be expected, therefore, that some species may be



FIG. 162.—*Pæonia Tenuifolia*.

found more successful, at least in certain sections, than those described.

Mist Plant (*Gypsophila paniculata*).—A much-branched plant with small glaucous leaves and producing a profusion of small white flowers that are very pretty for lightening up

bouquets and arranging with all kinds of flowers. It is also used to produce a mist-like effect in flower borders. The plant is perfectly hardy in open, rather dry places. The scientific name means gypsum-loving, because it likes calcareous soils. Other species, *G. cerastioides* and *G. repens*, are excellent for rock work.



FIG. 163.—*Pæonia Albiflora*.

Peony (*Pæonia*), Fig. 163.—The peonies belong to two distinct groups, the shrubby or tree peonies and the herbaceous species. The tree peony (*P. moutan*) produces a woody stem which annually increases until the plant attains a height of 3 or 4 feet. The flowers are more delicately shaded than the herbaceous varieties. Although considered hardy, the plants are benefited by a wrapping of rye straw or a covering of pine boughs. The herbaceous peonies

are chiefly of three species, *P. tenuifolia*, *P. officinalis* and *P. albiflora*.

P. tenuifolia, Fig. 162, the cut-leaved peony, is valuable for its rich crimson flowers, which appear in advance of the other species, and for its finely cut foliage. *P. officinalis*, the old-fashioned double white, rose and red peonies. These flower next in order. They are found in every old garden. There are single forms which are also worthy of a place in hardy flower borders. *P. albiflora*, Fig. 163, has given an almost endless number of varieties, many of which are fragrant. The flowers are single and double and the colors are white, often tinted yellow or cream, and shades of red varying from the most delicate blush to deepest crimson. All of the peonies are hardy and thrive in any good garden soil. They are gross feeders, and if good flowers are wanted, annual applications of manure should be made in the fall. Propagation is by division, and planting should be done in September or October. The peony is an exception to the general rule of plants in that it should not be transplanted every three or four years. This length of time is required for the average nursery-grown plants to really get established. Peonies may be found in old gardens that have never been transplanted and are still producing annual crops of flowers. It may be beneficial to transplant them occasionally into fresh soil.

Phlox (*Phlox paniculata*), Fig. 164.—The different species of phlox give a succession of bloom from spring until fall, but the most commonly grown of the perennial kinds is the *paniculata* group or summer-flowering phloxes. These showy plants are favorites everywhere for their neat habit of profuse bloom, wide range of color and general ease of culture. The colors range from white through shades of red to deep purple. The flowers are variously marked.

The next section in importance is *suffruticosa*, which

blooms earlier than the foregoing, but does not have the same range of color or size of flowers. They are valuable to lengthen the flowering season of the erect-growing type.

The earliest of the phloxes are the Moss Pinks (*P. subulata*). These are low-growing, creeping forms producing a carpet of bloom in spring. The colors are light blue,



FIG. 164.—*Phlox paniculata*.

pink or white. This species is used for carpeting beds or for edging. They succeed best in a warm, well-drained soil, the surface of which dries off rapidly. The wild Sweet William (*P. divaricata*) is deserving of attention and can be easily grown in flower borders in rich soil.

The summer-flowering perennial phloxes require a rich, rather moist, soil for best results, although they can be grown

in any good garden soil. Each clump should have sufficient space, as they become 2 or 3 feet across when fully developed, which is not until three or four years after planting. The finest flowers are produced on young or recently divided plants, but for landscape effect the large, old clumps are most satisfactory. The frequency of transplanting will be determined by the rate the centers of the clumps become weak or die out. The phloxes are benefited if mulched with strawy manure during winter. The clumps should be kept free from grass. They are propagated by division in the fall after growth has ceased or by means of cuttings of young shoots. The phloxes grow readily from seed, and inferior seedlings springing up around the clumps should be destroyed, since they often choke out the parent plants, producing the so-called "running out."

Pink (*Dianthus* *sp.*).—This large genus contains many species adapted to the flower border and the rock garden. They all like a warm soil, and the perennial species prefer one that does not become too wet, especially in winter. All are easily grown from seed. Among the well-known forms are the Sweet William (*D. barbatus*), which is one of the oldest garden flowers; common grass pink (*D. plumarius*), a low-growing, turfy plant suitable for edging beds or borders; Chinese pink (*D. Chinensis*), a more or less creeping plant with large showy flowers. This species has given a race of showy garden pinks, *D. Heddewigii*, which, however, are treated practically as annuals; although they will live over winter and flower the second summer. The carnation of the florists (*D. carophyllus*) is not hardy, and the English hardy border carnations are practically unknown in America.

Plume Poppy (*Bocconia cordata*).—An excellent plant for producing subtropical effects. The leaves are deeply lobed, of a glaucous green color, and the flowers are in plume-like

panicles followed by numerous pods that continue its beauty for a long time. It grows from 5 to 8 feet high and spreads rapidly, but not to such an extent as to be uncontrollable. By pulling up the suckers in the spring that come up beyond the limit of the space desired that it shall occupy, it can easily be kept within bounds, and this



FIG. 165.—Oriental Poppy.

thinning will result in a more vigorous growth of the remaining canes. Only a limited number of the shoots that start in the spring should be allowed to grow. All others should be pulled out or broken off as soon as they appear. Old clumps are benefited by applications of liquid manure in the spring.

Poppy, Oriental (*Papaver orientalis*), Fig. 165.—The prevailing color of the flowers of this species is a vivid orange

scarlet with large black blotches at the base of the petals and a great mass of the black stamens. The colors of the new hybrids range from silvery white, soft pink and salmon to dark-blood crimson and dark maroon. The plants are very hardy and once established in any good garden soil, are among the most permanent of the garden. A mulch of fine compost applied in the fall, and sufficient care to keep down the weeds and grass, is all the culture required. If there is a tendency to spread beyond the beds, it may be overcome by cutting down with a sharp spade around the margin of the bed and removing the roots and underground stems outside the limit. They are easily transplanted during their dormant season, which is August and September. After September they should not be disturbed.

Pyrethrum HARDY FEVERFEW (*Chrysanthemum coccineum*).—These flowers, called by some spring-flowering chrysanthemums, bloom in May and June. There are single and double varieties in colors ranging from snow white to the most intense scarlet and crimson. The plants are easily grown and are beautiful in both foliage and flower. They are hardy, but in dry seasons sometimes suffer from the heat unless the plants are watered. If the withered flowers are cut immediately, a new growth will produce flowers in the autumn. Plant in spring or September in a rich mellow loam. The plant deserves to be better known in American gardens. The plant is of additional interest from the fact that the *C. coccineum* and *C. cinerarifolium* flowers are used in some localities for the manufacture of the pyrethrum powder known under the name of Persian, Dalmatian and Bubach insect powders.

Rudbeckia, GOLDEN GLOW (*R. laciniata*).—This showy variety is a double-flowered form of the species and has been largely planted in recent years. Rudbeckia Golden Glow succeeds best in good soil abundantly supplied with moist-

ure. If well cut back when through flowering, it often gives a second crop of flowers. *R. Newmanii*, the perennial form of the Black-Eyed Susan, attains a height of 3 feet, and the deep orange-yellow flowers with a dark purple cone add variety to the flower border. *R. purpurea* (Giant Purple Cone Flower) has peculiar reddish-purple flowers



FIG. 166.—*Yucca filamentosa*.

with a large brown cone-shaped center, and blooms from July to October.

Sunflower (*Helianthus*).—Many of the hardy sunflowers are useful perennial plants. The plants of some species are tall, 5 to 12 feet, with large or very large attractive yellow flowers. Some kinds spread too rapidly to be desirable unless planted in a box or tub of soil. The plants are easily propagated by division. Planted in masses, sunflowers are very effective. *Helianthus decapetalus*, var. *multiflorus*, and its garden varieties do not spread so rapidly

as some of the other forms. The varieties differ in size and in the amount of doubling of the flowers, season of flowering and in habit of the plant. Thus this species is well adapted for planting in various situations. *H. orgyalis* is often grown because of its distinct and attractive foliage. All of the sunflowers are of easy culture, in a great variety of soils, but should have plenty of room, as they are gross feeders, and the advantage of full sun.

Yucca, ADAM'S NEEDLE-AND-THREAD PLANT (*Yucca filamentosa*), Fig. 166.—A very beautiful hardy plant for striking effects on the lawn, with its long, upright, narrow evergreen leaves and large panicles of drooping, creamy-white flowers, rising to a height of 4 or 5 feet. It is indispensable for the rockery, but is also appropriate in front of evergreens. It thrives even on dry banks where few plants will grow. It is easily propagated by division and should be transplanted in the spring.

Hardy Spring Flowering Bulbs

Few plants give more beauty for the labor and expense, than beds or masses of the Dutch or Holland bulbs. The only bulbs adapted for design beds are the hyacinth and tulip, and these should not be planted in the same bed for the finest effects. Care must be taken to select bright contrasting colors in varieties that bloom at the same time and at a uniform height. In making design beds it pays to remove the soil to a depth of 6 inches; then loosen up the lower soil, working in well-rotted manure and ground bone. Level off the surface and if the soil is heavy, add an inch of sand, which drains the water away from the bulbs. The bulbs are set on the sand layer, which enables the planter to properly arrange the design so as to get the bulbs properly spaced. Then carefully replace the top soil so that the bulbs will be covered to a uniform depth.

The mixed border is an admirable place for most hardy bulbs, since they may be planted in small colonies among herbaceous perennials and hardy shrubs. Twenty-five to a hundred bulbs may be planted in each patch. Among the important bulbs for this purpose are the various narcissi, daffodils and jonquils, cottage and parrot tulips, hyacinths, trilliums, erythroniums, crocuses, snowdrops, etc.

Hardy bulbs should be planted about six weeks before regular freezing weather. The depth to plant bulbs depends upon the kinds. Hyacinths, tulips, and narcissi, or similar large bulbs, are planted from 4 to 6 inches deep, smaller bulbs much shallower. If planted at the proper season and at the proper depth, the bulbs make a good root system preparatory to flowering in the spring. If planted too shallow, there may not be sufficient moisture for root growth, and of course late planting may prevent proper development. When a light crust is frozen, cover the bulbs with a 4- or 6-inch mulch of leaves, marsh hay or strawy manure, and this should be gradually removed in the spring.

Lily-of-the-valley (*Convallaria majalis*).—This little flowering plant, usually classed among the hardy flowering bulbs, is much sought for on account of its beautiful flowers. It is easily grown in shaded places. It spreads rapidly and should be taken up, divided and reset occasionally to insure an abundant bloom. One method employed to accomplish this is to cut out blocks or squares from the center of the beds and fill in with rich soil. A better method is to remove all the plants and replant the largest and strongest divisions. A light dressing of compost in the fall will improve the size and increase the number of flowers produced.

Tender Summer-flowering Bulbs

Dahlias (*Dahlia* *sp.*).—Dahlias are essentially flower-garden subjects, requiring rich soil and careful culture. Usually they do not give good results among other plants unless they have considerable space, as the plants require plenty of air and sunlight. They thrive in any good soil that has been enriched, although a sandy soil is preferred. Single tubers are best for planting, which may be done two weeks before danger of frost is over. Earlier than this may result in the shoots being killed, as they are tender. This, in the latitude of New York City, would be about May 1st. The roots should be planted from 6 to 8 inches deep, although if the soil is heavy, it is best not to fill the soil so that the surface is level, but gradually work the soil around the plants as they increase in height. A common method of culture is to cover the tubers 2 or 3 inches deep in the bottom of the furrows, and when the shoots appear, remove all but the strongest one, which is pinched as soon as two pair of leaves are formed. This causes the plant to branch below the surface of the ground, thus making staking unnecessary. The plants, having the entire strength of the root and soil concentrated in one shoot, grow very vigorously. Thorough cultivation should be given. Deep tillage is beneficial until plants begin to bloom, when light stirrings of the surface should be made. If the plants cease blooming, a small handful of bone meal and nitrate of soda should be given. The most serious insect pest is the tarnished plant bug. When frost has killed the plants, dig the tubers, allow them to dry for a few hours, and store in a frost-proof cellar. If the air of the cellar is dry, pack the roots in dry sand or in sawdust to prevent shriveling. Varieties of dahlias are propagated by division of the clumps and also by cuttings taken from tubers started in

early spring under glass. Seeds do not reproduce the variety.

Gladiolus.—Among the summer-flowering plants, none gives a richer display of color than the gladiolus. This plant can be flowered in any good soil. It may be planted in beds or in clumps, in borders or in the flower garden. Successive plantings may be made at intervals of two weeks, beginning during the latter part of April and continuing until July 1st. The bulbs are planted about 6 inches apart, but if wanted for cut-flowers, plant in rows 18 inches apart and 4 to 6 inches apart in the row. The bulbs should be planted from 4 to 6 inches deep, according to size. This depth allows for the proper development of the new bulb on top of the old, and also does away with stakes. Keep down the weeds and conserve the moisture by frequent cultivation. After the frost has killed the plants, cut the stalks close to the bulbs, and place them in a cool, dry place to ripen; after which, remove the remains of the old corm and store in baskets or trays at a uniform temperature of 40° Fahrenheit.

Bedding and Foliage Plants

The best flowering bedding plant is the geranium. There are numerous varieties, but among the best are S. A. Nutt, Beauté Poitevine, General Grant, Alphonse Ricard, Miss F. Perkins, L'Aube, Mrs. E. G. Hill, Dryden, Marquis Castellane, Madame Récamier, and Snowdrop. There are single- and double-flowered varieties, some being adapted for bedding and others for indoor culture. The ivy-leaved varieties are suitable for window boxes and vases. This plant is propagated by means of cuttings and in the Northern States is carried over winter in the house or in a greenhouse.

Among the most desirable bedding plants are those with colored foliage. Those propagated by means of cuttings are

Alternanthera, Coleus, Iresine (Achyranthes), and the Foliage Geraniums. The best of the latter is the variety Madame Salleroi, which is of dwarf habit, 6 to 8 inches high, foliage green bordered with white, and used for edging beds.

The foliage plants commonly grown from seed are Centaurea Cineraria (often called Centaurea candidissima) and Centaurea gymnocarpa. These are commonly known as "Dusty Millers" and are used for edgings, vases and hanging baskets. Golden Feather (*Chrysanthemum parthenium*, var. *aureum*) is valuable for its yellow foliage. Another annual foliage plant is Joseph's Coat (*Amaranthus tricolor*). This plant has red, yellow and green leaves, but owing to its tall habit is suited to the flower border instead of for beds.

Annual Flowers

There are a large number of hardy, half-hardy, and tender annual flowers, which may be used to decorate the home grounds or to add to the display in the flower garden. Many of these may be sown in the open ground, while a few, like cosmos, scarlet sage and moonflowers, should be started in the house, hotbed or greenhouse. Although many flowers can be sown outside, and a satisfactory display of flowers may be produced, their season may be extended by starting the seedlings indoors. The annuals suitable for bedding are alyssum, ageratum, California poppy (*Eschscholtzia*), coxcomb (*Celosia cristata*), French marigolds (*Tagetes patula*), petunias, Drummond's phlox, portulaca, scarlet sage (*Salvia splendens*), snapdragon, stocks, verbena and zinnia.

The annuals desirable for edging are, sweet alyssum, ageratum, *Dianthus Heddewigii*, *Lobelia erinus*, nasturtium, portulaca, and verbena.

The tall growing annuals are desirable for filling in the mixed borders, among the hardy perennials, in order to keep

up the floral display throughout the season. If a supply of annuals in pots is provided, they can be set at any time during the season, when required. Among the best annuals are asters, balsams, calendula, calliopsis, centaurea, celosia, cosmos, datura, four o'clock, African marigold, larkspur, mignonette, petunias, poppies and zinnias.

An interesting annual, now often planted, is standing cypress or Belvidere (*Kochia trichophylla*), which can be used for hedges or planted in formal gardens. The plant is a lively green during summer, but turns a vivid red in autumn. It grows about 3 feet high, and when it has room, develops as symmetrically as an evergreen.

Pansy (*Viola tricolor*).—When properly grown no early-blooming flower gives more satisfaction—so much show outside and so many flowers for indoor decoration. To obtain the best results the seed should be sown in August in a cool, slightly shaded, airy place, and when three or four of the middle leaves have formed be transplanted to a bed where they may be protected for a time from very severe freezing until they have reached a size to show some flower-buds. They should then be exposed to the weather to harden them off and be protected from severe freezing during the winter by a covering of pine boughs and a few leaves. Too deep covering will destroy the plants by producing fermentation. In the spring the covering should be removed as soon as severe freezing is over, in this section about April 1st, fine rich manure be worked in about the plants, and the soil settled by a heavy watering. All of the very early buds should be removed as soon as open until the plants have gained good size and are vigorous, when the blossoms may be allowed to mature which will then be of large size. These plants may be transplanted to beds on the lawn or in the garden and will produce large quantities of blossoms for two months, i.e., April to June. All

faded flowers should be removed and none of the seed-pods be allowed to mature if the largest flowers are desired, as the development of a single seed-vessel will exhaust the plants more than the production of a dozen flowers.

Hardy Annual Climbing Plants

Sweet Pea (*Lathyrus odoratus*).—This plant is extremely popular, and deservedly so, for if we consider its great range of color, fragrance, suitability as a cut-flower for decoration, range of adaptation, etc., it is unrivaled. The plant is easily grown, and the seed is so cheap that there is no excuse for any one being without this delightful flower. The best results are secured on a rich cool soil, and from early planting. The soil should be prepared in the fall, but may be fitted in early spring if unavoidable. The soil should be spaded 18 to 24 inches deep, working in 6 to 8 inches of manure and one to two pounds of bone meal per lineal yard of row. If the soil is left slightly ridged where the row or rows are to be made, the soil will dry more rapidly in the spring. The ridges should then be raked level, a good dressing of acid phosphate applied, and the rows marked out 3 inches deep. The seeds should be sown 2 inches apart and the soil made level. The seeds must be sown just as early as the ground is dry enough to work.

The best support is good twiggy brush, if obtainable; otherwise a 3-foot strip of common poultry netting should be stretched along the row and supported by strong stakes or small posts. If the supports are allowed to extend above the top of the netting, the sweet peas that grow taller than the height of the netting, may be supported by strings stretched along each side of the row and tied to the stakes. Constant picking of the flowers and the removal of the seed pods will prolong the flowering period. Nothing exhausts the plants so rapidly as the production of seed.

There are several types of sweet peas, i.e., garden, winter-flowering (for growing in greenhouses), and the dwarf or cupid. There are a great many varieties of the garden type, but at the present time the waved or Spencer varieties are the best. The winter-flowering varieties are sometimes planted outside for very early flowers, but are surpassed by the garden varieties in size of flowers. The cupid sweet peas grow about 8 inches high and are suitable for edgings. They succeed on dry, light soils, and like more heat than the other sweet peas. They succeed better in California than elsewhere.

Tender Annual Climbing Plants

Among the best tender climbers for flowers, are canary-bird flower (*Tropæolum peregrinum*), cardinal climber (*Ipomæa Quamelit hybrida*), cobeia, cyprus vine, hyacinth bean (*Dolichos Lablab*), moonflower, morning glory, nasturtium and scarlet runner bean.

Some vines are desirable for their rampant growth, i.e., wild cucumber or balsam apple (*Echinocystis lobata*), and various species of gourds. These may be used for temporary screens or for covering old sheds, etc. The hop-vine may be similarly used. The balloon-vine (*Cardiospermum Halicacabum*), has interesting fruits. Some vines have a perennial root, but the top is annual, i.e., allegheny vine (*Adlumia fungosa*), cinnamon vine (*Dioscorea Batatas*), and Japanese kudzu vine (*Pueraria Thunbergiana*). The best climber for a very warm situation is maderia vine (*Boussingaultia baselloides*). This vine has tuberous roots which must be lifted and stored during winter. It is a tender vine, which attains from 10 to 20 feet in a season, and bears fragrant white flowers in the autumn. In the North, it should be planted in full exposure to the summer afternoon sun. Because of its tidiness, it is suitable for planting on porches.

Subtropical Plants

Strongly marked features in lawn or in garden may be produced by the use of subtropical plants, i.e., those with large leaves or large growth of stem and flowers. They may be so grouped together as to render otherwise tame landscape views attractive. Most of these plants being tender and requiring a rich and moist, warm soil, they cannot be put out until the ground has become well warmed and are better to be started under glass and grown to considerable size if immediate effect is desired. Among those that can be most easily grown and give the best results are the following:

Canæ (*Canna*, vars. and hybrids), Fig. 167.—These rapidly-growing plants vary from 1 to 6 feet in height, and in foliage from the brightest green to a very dark purple, and with a great variety of blossoms, especially the new strains of the French and hybrid cannas, which are exceedingly showy and beautiful. The tubers are easily preserved in any warm, medium-dry cellar, and are rapidly propagated by division in March or April, each bud making a strong plant. For those who have no greenhouses the windowbox or a shallow box of soil placed behind the kitchen stove or in a light, warm cellar will serve as a very good place in which to propagate them. The tubers should be cut into single eyes or buds, covered with 2 or 3 inches of rich, sandy soil, and the temperature kept at about 65°, when they will quickly start into growth and be ready for transplanting to the open ground about June 1st. In grouping cannas the best results are obtained by placing varieties in groups, with as great a contrast of foliage or color of flowers as possible; the larger ones in the centre of the bed or group and the smaller ones on the outside. Most of the leading florists and seed- and plant-dealers now offer an abundance of



FIG. 167.—Canna (*Canna, hybrid*)

beautiful varieties at low prices, and when a small stock is once obtained by a little skill in keeping them through the winter it may be increased very rapidly.

Castor Bean (*Ricinus communis*), Fig. 168.—This plant



FIG. 168.—Castor-bean (*Ricinus communis*).

is especially ornamental on account of its broad lobed leaves, large showy panicle of flowers, and fruit-pods. The seed should be started in pots under glass or in hotbeds, in April, and be grown to a foot or more in height before planting out to obtain results early in the season. They should

not be put out into the open ground, however, until about June 1st. As a single specimen in the centre of a large bed or as the background for other small foliage-plants they are very effective.

Caladium (*Caladium esculentum Hort.*).—The leaves of this plant are broad and heart-shaped, often 2 feet across, and hanging obliquely on the leaf-stalk make very beautiful borders for beds of cannas or castor bean plants, or



FIG. 169.—Egyptian Papyrus (*Papyrus antiquorum*).

they make pleasing single specimens on the lawn. It is also especially useful among rockwork and on the border of water. It required the same treatment as the canna, though perhaps more heat in starting it into growth than the latter.

Egyptian Paper-reed or Papyrus (*Papyrus antiquorum*), Fig. 169.—This beautiful plant is being much less used than it should be. It is one of the most beautiful and easily grown plants, either on the lawn, in ordinary garden soil, or on the borders of ponds or basins of fountains. Plants

in 6- or 8-inch pots planted in early June will make clumps that would fill a 15-inch pot and be 8 feet high by September. It is best wintered over in a warm greenhouse and should have an abundance of water. Probably it could be carried over in a warm cellar, but I know of no instance of its having been done.

Abyssinian Banana (*Musa Ensete*).—In a warm, sheltered location, where the wind will not whip and lash the leaves, this is one of the grandest of the subtropical plants. For the best results the seed should be started under glass at least one year before they are wanted for outdoor work, at which time they should be 4 feet high and in 10-inch pots. In a warm, rich soil such plants will grow to 10 feet in height in a single season, and nothing gives a more tropical effect on the lawn or in the garden. Plants may be wintered over in a warm, dry cellar or in a cool greenhouse and be made to serve two or three summers' decoration.

The Blue-gum Tree (*Eucalyptus globulus*).—The beautiful blue or glaucous color of the foliage of this tree together with its rapid growth makes it very useful upon the lawn. It is even more glaucous than the best of the Colorado blue spruces, and in contrast with the dark foliage of evergreens, purple beeches, plums, etc., the effect is very beautiful. The plants must be started about a year before wanted and be kept growing, when they will reach from 4 to 6 feet in height. Such plants out of doors in June and in rich soil will grow to 10 or 12 feet in one season. They can be carried over for a second year's decoration by moving to a cool greenhouse before severe frosts.

Cacti.—Many species of these unique and picturesque plants may be used for outdoor decoration during the summer, and especially in connection with ledges and rock-work, where they are very appropriate. None of the large

species are hardy and must be wintered in a cool greenhouse or very dry cellar. The plants when thus set out make a clean, healthy growth during the summer, and need to be kept very dry during the winter. It is generally better to plunge the pots rather deep in the ground than to turn them out, especially if the soil is inclined to be dry.

CHAPTER XIV

AQUATIC PLANTS, HARDY FERNS, AND ORNAMENTAL GRASSES

Aquatic Plants

WHEREVER bodies of water occur, whether large or small, natural lakes, streams, artificial ponds, or fountain-basins, their decoration with more or less of the water-loving plants—*aquatics*—can be made to greatly increase the naturally beautiful effects of such features of landscape, Fig. 146. Much interest has been awakened in the past few years in these plants, and many growers of, and dealers in, aquatic plants are found in different sections of the country. There has been a great increase in the growth of these plants for ornamentation, especially in parks and public grounds as well as on many private places. Many of the *aquatics* are easily grown in any shallow body of water that is not fed by cold springs or mountain streams, but some of them, like the *Victoria regia*, require more or less artificial heat, that may be carried to the water by steam or hot-water pipes from some greenhouse or other heating-plant. Many of them are started from seed, while some of them are propagated by division of the roots. Full direction for germinating the seed and growing the plants may be obtained from the catalogues of dealers in this class of plants. The growth of only the most hardy of these plants should be attempted unless one has a warm shallow pond, or tank, with a sunny exposure, or can in some way apply artificial



FIG. 170.—An Aquatic Garden.

heat. In cases of sudden low temperature some means of protecting the plants should be at hand.

Soil.—The soil best suited to the growth of most of the aquatics, especially the water-lilies, is one made of equal parts of good garden soil and well-decomposed stable manure. If the plants are grown from seed, they need to be transplanted two or three times until large enough to put into the open air, when they should be planted in a box or tub or be sunken in the mud, in a pond or tank, pressing the soil firmly about the roots, and then covering the surface of the soil with coarse sand or gravel. It matters little what the depth of water over the plants is after well established; it may be 3 inches or 3 or more feet; but for the water-lilies, it should never get so low as to have the leaves rest on the soil for any considerable length of time. After good growth has begun, if the soil is in the proper condition, but little care need be given except to see that the water does not all evaporate, or that muskrats do not get at and destroy the roots, of which they are very fond. Every means possible, by poisoning, trapping, shooting, etc., should be taken to get rid of the above pests, as a single pair of these animals will destroy a large number of plants in a short time. Among the plants that grow directly in the water are the following:

Lotus, Egyptian.
 Lotus, White Japanese.
 Lotus, Striped Japanese.
 Lotus, Native.
 Water-lilies, *Hardy*.
 Water-lilies, Rose-flowered
 Water-lilies, Large-flowered.
 Water-lilies, Yellow-flowered.
 Water-lilies, European.
 Water-lilies, *Day-blooming*.
 Water-lilies, Purple African.
 Porcupine-plant.

Water-lilies, Royal Purple.
 Water-lilies, Superb.
 Water-lilies, Devonian.
 Water-lilies, East Indian.
 Water-lilies, White African.
 Water-lilies, Royal or Victoria.
 Water-hyacinth.
 Water-poppy.
 Salvinia.
 Papyrus, Egyptian.
 Flag, Variegated.
 Arrowhead.

Parrot's-feather.
Wild Rice.
Cat-o'-nine-tail.
Burweed.
Water-plantain.

Scouring-rush.
Pickerel-weed.
Bulrush.
Bur-marigold.

East Indian Lotus (*Nelumbo roseum*), Fig. 172.—A most beautiful plant, with large peltate or round-shield-shaped leaves and large pink or rose-colored flowers. It is easily grown in shallow, *warm-water* ponds, or in tubs, where it blooms freely. Use a rich, heavy, but not clayey loam.

The other species of nelumbiums that succeed almost equally well with the above and require the same treatment are the **WHITE JAPANESE** (*N. album grandiflorum*), **STRIPED JAPANESE** (*N. album striatum*), and the **EGYPTIAN LOTUS** (*N. speciosum*). The latter resembles the first species, but the flowers are paler in color and not so large and full. The native **YELLOW LOTUS** (*N. lutea*) is found growing in the ponds and streams of the South and Southwest, and succeeds as an annual in warm, sheltered places much further north. All of the above species are claimed to be perfectly hardy in the Northern and Western States if covered with water deep enough so that the ground around their roots will not freeze, i.e., 2 to 3 feet deep, according to latitude.

Hardy Water-lilies.—Our native water-lilies, found in many sections of the country, are very beautiful and easily grown, the principal requirements being a deep, muddy soil. Only water enough to cover the roots is all that is absolutely necessary, but they generally grow to greater perfection in 2 or 3 feet of water. In deep water they are easily planted by tying the roots to stones and dropping them in where wanted.

Many beautiful varieties are now propagated and offered for sale, among the best of which are the **ROSE-FLOWERED**



FIG. 172.—East India Lotus (*Nelumbo roseum*).

WATER-LILY (*Nymphaea odorata*, var. *rosea*), Fig. 172,
LARGE-FLOWERED WATER-LILY (*N. o.*, var. *superba*), YEL-
LOW WATER-LILY (*N. o. sulphurea*).

The European White Water-lily (*N. alba* var. *candidis-*



FIG. 172.—*Nymphaea Rosea*.

sima) produces rather larger flowers than our native species, is equally hardy, and a more abundant bloomer.

Tender Water-lilies.—The flowers of this group of water-lilies give a greater variety of forms and colors than those last described. They bloom more freely, showing flowers from July to September, if planted in shallow warm-water

ponds or basins. They can also be grown in tubs with good success, but the roots must be wintered in a greenhouse-tank or be purchased at the beginning of every season. If considerable skill is exercised by covering the plants with barrels, then with leaves and straw, they may be carried over winter in the tank or pond.

They may be divided into two groups: i.e., first, those blooming during the day, opening in the morning and closing at night; and second, those opening in the evening, remaining open during the night and until toward noon the following day.

The best of the DAY-BLOOMING varieties are: PURPLE ZANZIBAR OR AFRICAN LILY (*Nymphaea Zanzibarensis*), ROYAL PURPLE AFRICAN LILY (*N. Z. var. azurea*), SUPERB AFRICAN LILY (*N. Z. superba*). These species may be had in bloom constantly from July to September, if planted in rich soil in shallow, warm water in ponds, basins, or tubs. For the best results in tubs they should be placed on the south, southeast, or southwest shelter of buildings or shrubbery, where the sun will strike them for 6 to 8 hours per day. A bright, sunny exposure is also desirable for the location of the pond or tank, that the water may be kept as warm as possible.

The best varieties of the NIGHT-BLOOMERS are: The DEVONIAN WATER-LILY (*Nymphaea Devoniensis*), one of the choicest and most beautiful, with bright rose-colored flowers and scarlet stamens. EAST INDIAN WATER-LILY (*N. rubra*). WHITE AFRICAN WATER-LILY (*N. dentata*), one of the most free bloomers, with flowers of large size and very easily grown. ROYAL WATER-LILY (*Victoria regia*), the largest of all the water-lilies, its leaves often measuring 4 feet across and the flowers a foot in diameter. Very few persons succeed in blooming this royal flower, and then it is done only where artificial heat is introduced from some

greenhouse or other steam or hot-water plant near by. But where such facilities are available the results generally well repay the effort, for nothing of an aquatic growth can exceed the grandeur of the immense floating leaves and large gorgeously colored flowers of this plant.



FIG. 173.—Water-poppy (*Limncharis Humboldtii*).

Many other water-loving plants besides the water-lilies may be used with good effect in aquatic gardens. These may be divided into those growing directly in deep water and those growing in the moist soil on its borders. Of the first are the

Water-hyacinth (*Eichhornia crassipes*).—The flowers of this plant resemble those of the common light-blue hyacinth,

and by some it is likened to a species of orchid-blossoms. It grows freely in shallow warm water, each plant, after separating from its parent, floating, driven about by the winds or currents from one side of the pond or basin to the other. It blooms freely and the very abundant floating roots and inflated petioles or leaf-stalks are very interesting.

Water Poppy (*Limncharis Humboldtii*), Fig. 173.—The bright lemon-colored flowers of this little plant add very greatly to the beauty of any collection of aquatics. Plants set out in June grow rapidly and bloom freely.

Salvinia (*S. Braziliensis*).—A very pretty little floating plant with light-green, almost heart-shaped leaves, covered with many soft hairs. It grows freely, and floating about among the larger plants has a very pleasing effect.

Papyrus or Reed Paper-plants (*Papyrus antiquorum*).—This plant has already been described under “Subtropical Plants,” but is equally useful and beautiful for the borders of ponds and fountain-basins. It is one of the most beautiful of plants, wherever grown, its graceful umbrella-like clusters of leaves being entirely unlike any foliage of the temperate zone. It grows equally well on the banks or in the water at the border, and makes a beautiful centre plant for a group of other upland aquatics or in large clusters by itself.

Variegated Flag (*Acorus gramineus* var. *variegatus*).—Our native “sweet flag” is familiar to most persons, and this plant is very much like it except that it has most beautifully variegated green and white leaves. It is perfectly hardy and grows freely.

Porcupine Plant (*Scirpus Tabernæmontani* var. *zebrina*).—A beautiful hardy plant with round leafless stems, beautifully marked in sections of white and green, giving it something of the appearance of the quills of the porcupine. This plant and the variegated flag can be so grouped with

the light- and dark-green, the broad- and the narrow-leaved aquatics as to produce most beautiful effects.

Parrot's Feather (*Myriophyllum proserpinacoides*).—This beautiful plant will serve so many purposes for water decoration, makes so rapid growth, and is so easily grown that it should be cultivated more often than it now is. It makes a most beautiful border-plant for ponds and fountain-basins, and planted in the pans of large fountains its drooping growth in with the falling water produces most charming effects. It may be successfully grown in hanging baskets or basins and over the stones in aquaria. It is so easily propagated that even small shoots, taken off and placed in rather warm water, root in a very few days.

Wild Rice (*Zizania aquatica*).—A rapid-growing grass of large size and graceful form. It is easily grown, in fact in some places it spreads so rapidly from self-sown seed as to become a nuisance unless heroically weeded out in the early summer.

Many native plants are useful for decorating borders of ponds and streams, among the best of which are the following: CAT-TAIL (*Typha latifolia*), BUR-REED (*Sparganium simplex*), WATER-PLANTAIN (*Alisma plantago-aquatica*), ARROWHEAD (*Sagittaria latifolia*), SCOURING-RUSH (*Equisetums sp.*), BULRUSH (*Scirpus sp.*), PICKEREL-WEED (*Pontederia cordata*), BUR-MARIGOLD (*Bidens sp.*), and many species of sedges (*Carex*), all of which are found in or about our ponds and streams and many may be easily transplanted to more cultivated locations. Some of them, like the *Bidens* and *Typha*, etc., seed very freely, and a little heroic thinning will be needed to prevent them from over-running the space needed for more desirable plants.



FIG. 174.—Group of Hardy Ferns.

Hardy Ferns

There are many hardy species of large-growing ferns that are beautiful and easily grown and especially suited for the decoration of moist, shaded places. They thrive best in a rather moist soil, but if in the shade many of them will grow luxuriantly in even thin soil if some compost is put about the roots in the fall. They are easily transplanted and may be moved from the woods or roadside at almost any time if a large clump of roots and soil is taken up, but perhaps the best time is when they are beginning to grow in the spring and early summer. Fig. 174.

Among the best are MAIDENHAIR FERN (*Adiantum pedatum*), ROYAL OR FLOWERING FERN (*Osmunda regalis*), CINNAMON FERN (*Osmunda cinnamomea*), INTERRUPTED FERN (*Osmunda Claytoniana*), WOOD OR SHIELD FERNS (*Dryopteris marginale* and *spinulosa*), CHRISTMAS FERN (*Polystichum acrostichoides*), OSTRICH FERN (*Onoclea struthiopteris*), RATTLESNAKE FERN (*Botrychium virginianum*), BLADDER FERN (*Cystopteris bulbifera*). POLYPODY OR WALL FERN (*Polypodium vulgare*), and *Woodsia Ilvensis* and *obtusata* are especially useful for rocks and dry wooded places.

Ornamental Grasses

Fig. 176 shows a very pretty grouping of grasses about the underpinning of the house.

A number of hardy and very ornamental grasses may play an important part in home lawn decorations, either in masses by themselves or planted with groups of other decorative plants, trees, or shrubs. They are easily grown from seed and propagated by division of the clump; one clump of two or three years' growth may often be divided so as to make a score or more plants. The great advantage of these grasses is that most of them are perfectly hardy and require but little care. Among the best are the following:

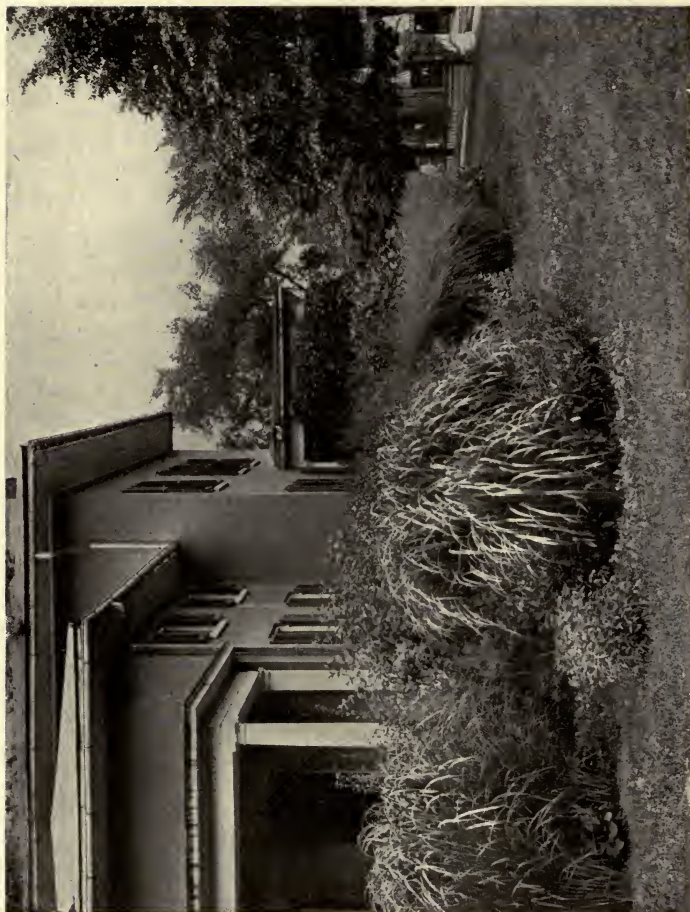


FIG. 175.—Ornamental Grasses.

Pampas-grass (*Cortaderia argentea*), not quite hardy north of New York City, JAPAN PLUME-GRASSES or EULALIAS (Fig. 127), *Miscanthus sinensis*, *M. s. var. zebrina*, *M. s. var.*

variegatus, and *M s. var. gracillimus*.) The eulalias all make beautiful winter decorations arranged by themselves or with other "immortelle" flowers. GIANT REED (*Arundo Donax*), requiring some protection at the North, both



FIG. 176.—Japanese Plume-grass *Miscanthus sinensis* var. *zebrina*.)

plain and variegated, etc., and RIBBON-GRASS (*Phalaris arundinaceæ*), plain and variegated, are ornamental. The last species spreads rapidly and should be kept within bounds by spading up and pulling out all the suckers or stolons as soon as they get beyond the limits of the bed or space it is desired that it shall occupy.

CHAPTER XV

INSECTS AND FUNGI ATTACKING ORNAMENTAL TREES, SHRUBS, ETC.

ONE of the greatest difficulties one has to contend with in the care of ornamental trees, shrubs, etc., is the injury caused by insects and fungous pests, and in this chapter a brief outline of the most destructive pests will be given, with the best and most easily applied remedies.

The injury done to ornamentals by the above pests is very great, though not so large as that to fruit and garden crops. It is the history of all cultivated plants that the longer and more largely any one kind is grown the more rapidly will its natural enemies, i.e., insects and parasitic fungi, increase, and the more ornamental homes we have the more need there will be to resort to protective or remedial measures to secure satisfactory growth.

No attempt will be made at a strictly technical description of species, but the author will endeavor to give a brief, plain description such as will enable the practical gardener or home-owner to detect the pests that may be injuring his pets and to apply remedies that shall save them from destruction.

In making up this list the author is indebted to the many carefully recorded results given in the bulletins of the experiment-stations published by several States, which together with a large practical experience in the care of nearly all species and varieties of ornamental trees, shrubs, etc., he hopes will enable him to present the latest and best

methods of preventing serious loss from the above pests. The reader is referred to the popular bulletins published by the various experiment-stations often giving illustrations of destructive insect or fungous pests with full treatment for their destruction. If one finds a pest at work and is not familiar with it, specimens should be sent at once to the entomologists or botanist of the station of his state for identification and advice as to remedies.

Insecticides

(Insect-destroyers.)

Practically there are but very few of the common insecticides needed or of much value in the preservation of farm, garden, or ornamental crops, and these are Paris green, arsenate of lead, Pyrethrum powder, hellebore, lime and sulphur solution and soluble oils, whale-oil soap, and tobacco water. The first four are used for the destruction of chewing insects and the others for sucking insects.

Paris Green is a deadly poison and should be used with extreme caution, and never be applied in large quantities to crops used as food or be kept in such places as to be accessible to irresponsible persons or children.

Pure Paris green contains but a small per cent of soluble arsenious acid, and can be used without injury upon most plants in sufficient quantities to destroy any insects that feed by biting or chewing the parts. Samples containing more than 4 per cent of soluble arsenious acid should be used with considerable caution.

Paris green alone can be safely used only at the rate of 1 pound to 250 or 300 gallons of water. This, however, is a very small quantity, and to enable more to be used lime is added to neutralize the soluble arsenious acid. Two pounds of lime slaked in water and added to 25 gallons of water will enable us to use as much as 1 pound of Paris green

to 100 and even 50 gallons of water without injury to the foliage. When the Bordeaux mixture (see "Fungicides") is used, the lime in that mixture has the same effect, and 1 pound of Paris green to 50 or 100 gallons of the mixture may be used without injury to the foliage (except upon the peach and cherry trees), and the work of destroying insects and fungi thus reduced one-half.

Arsenate of Lead is similar in effect to Paris green, but is a combination of arsenic with lead instead of copper. It is less soluble than the former, adheres longer to the foliage and will not burn the leaves when used in large quantities. It can be used with the Bordeaux mixture or the lime sulphur solution, and being in the form of a white powder or paste may be more readily detected upon the leaves. In cost it is about the same per pound as Paris green, but about twice as much is needed to do effectual work. Arsenate of lead may be used as a dry powder with lime or flour or in water.

Lime-sulphur Solution.—This is a solution that kills scale, aphides (plant lice), etc., by contact, many brands of which are to be found in the market.

It is unpleasant to use on account of its caustic properties, and in spraying it is best to apply *with the wind*. It is effectual as a fungicide used at the rate of from 3 to 5 gallons to 50 gallons of water while the trees are dormant, or 1 to 1½ gallons to 50 of water when in foliage. SELF-BOILED lime-sulphur is made by slaking fresh caustic lime in a small amount of water and when at its highest adding an equal quantity of fine sulphur. Cover and let boil until a molasses-like liquid is formed, which is to be diluted as for the commercial lime-sulphur solution.

☞ **Soluble Oil** is made by treating crude petroleum so as to make it soluble in water. This kills scale insects, aphides, etc., and all sucking insects by contact.

For scale insects it is applied to the trees at any time after the leaves fall in the autumn until growth begins in the spring.

Both this and the lime-sulphur solution are equally effectual in destroying scale and other insects, but the oil spreads more evenly over the small branches and buds and does not require quite as much care in application.

In the application of both insecticides and fungicides the directions given upon the packages should be carefully followed.

Hellebore Powder.—This is a fine powder made from grinding the roots of *Veratrum album*, and will kill most chewing insects. It, however, is more expensive and does not adhere so well to the foliage as Paris green and arsenate of lead, even if used in lime solutions or water. It will not, however, injure the foliage, and is not nearly so poisonous—not dangerously so unless taken into the lungs or stomach in large quantities. It is best used in water or dusted on while the foliage is wet with rain or dew.

Kerosene Emulsion.—*Formula:* $\frac{1}{2}$ pound common bar soap, 2 gallons water, 2 gallons common kerosene.

Dissolve the soap in the hot water; while still hot, add the kerosene and churn back and forth with a garden-pump or syringe until a milk or cream-like liquid is formed. When cold, dilute with water to make from 10 to 25 gallons of liquid. This is used for the destruction of sucking insects like aphides (plant-lice), scale insects, etc.

Whale-oil Soap is very frequently used as an insecticide at the rate of from 1 pound to 3 to 5 gallons of water, according to the insect to be destroyed.

Pyrethrum or Persian Insect Powder.—This substance is made from the flowers of two or three species of pyrethrum or feverfew (*chrysanthemum*), the flower-heads of which are ground to a fine powder, known in the markets as pyre-

thrum, Dalmatian, Persian, or Buhack insect powder. When dusted upon some kinds of insects in the latter part of the afternoon or evening, it will paralyze them and those remaining under its influence during the entire night are killed. Many of these insects would soon recover if it were applied in the morning or middle of the day. Young insects are more susceptible to its effect than older ones, but as most of the aphides and other sucking insects are short-lived, several applications at intervals of a few days or a week will destroy most of them.

Fungicides

(Fungus-destroyers.)

The use of fungicides becomes necessary to protect many of our trees and shrubs from fungous growths, i.e., mildews, rusts, blights, etc., which often do serious injury, and lime sulphur solution or copper in one form or another is the substance most commonly used to destroy these pests. When once a fungous growth has become established in the tissues of a plant, nothing will kill or dislodge it that will not destroy the host plant, but the spores or seeds of the fungus may be killed or be prevented from germinating by a very small amount of copper solution or other fungicides coming in contact with them.

To prevent the growth, therefore, of the spores of rusts, smuts, mildews, etc., it becomes necessary to have the fungicides on the parts of the plants likely to be affected whenever the spores (*seeds*) come in contact with the plant under conditions of *high temperature and moisture*. These spores are produced in immense numbers, an illustration of which may be seen in mass of spores forming the large fruit-bunches of the "corn-smut" or the dust of the puffball, the black substance of the first and the fine gray powder of

the last being composed of myriads of spores or seeds. These spores are very small, so small in fact that they are individually scarcely perceptible to ordinary vision and are carried about by the slightest breath of air.

Much may be done to prevent the growth of fungus pests by keeping the trees or plants in a vigorous, healthy growth. This may be done by good cultivation and an abundance of plant-food, under which condition the growing spores are not so likely to gain a foothold in the tissues of the host plant; but even with the most vigorous growth we sometimes find that if the weather is unusually hot and the atmosphere very moist the spores will gain a foothold and we must have the fungicide on the surface of the plant to prevent the growth of the spores should the plant not be able to withstand their attack.

Some seasons, and often for a series of years, our trees escape injury from fungus pests, but we cannot hope to escape always, and it is the part of wisdom to learn with what pests we are threatened, what is the best remedy, and how and when to apply such remedies as to most certainly destroy each pest. Among the best fungicides are the following:

Copper Sulphate (*Blue vitriol*).—Copper has long been known to be destructive to the spores of nearly all kinds of moulds, mildews, rusts, etc., but not until within a few years has it been largely used for the purpose of destroying these growths on cultivated trees, plants, and farm crops. The form in which it is most used is that of copper sulphate or blue vitriol, in which the copper is united with sulphuric acid and is in the form of blue crystals (blue stone). In this form it is quickly soluble and very injurious to the growing parts of plants unless used in a very dilute form; 1 part of copper sulphate to 150 or 200 parts of water being as concentrated as it can be used without injury. In this form it is

quickly washed off by heavy rains, and to prevent this lime is used with it, forming what is known as the

Bordeaux Mixture.—*Formula:* 4 pounds copper sulphate, 6 pounds caustic (unslaked) lime, and 50 gallons water.

By combining the copper and lime it is found that the copper sulphate may be used more freely and with less injury than if used alone, and that it will adhere a long time to the foliage. To make the Bordeaux mixture, dissolve the copper in hot water (or if placed in a coarse sack or basket and suspended in a tub of cold water it will dissolve in two or three hours, while if put in cold water on the bottom of a tub or vessel it remains undissolved for a long time). Then in a separate tub slake the lime thoroughly and when both are cold pour the two together, stirring constantly. Dilute with water to make 50 gallons of liquid. In this form it is more difficult to apply than a simple solution, but the lime causes it to adhere for a long time and spraying need not be so frequently done. Before using, the mixture should be strained through a burlap or fine wire strainer to take out the coarse particles in the lime. The Vermorel or some other adjustable nozzle that will throw a very fine spray or mist must be used to distribute the material evenly and without waste over the surface of the plants.

If insects are found attacking the plants to be treated for fungous growths, Paris green or arsenate of lead may be added to the Bordeaux mixture at the rate of from 5 to 8 pounds to 100 gallons of the mixture, and, as stated on a previous page, the lime will prevent this large quantity of the arsenate from burning the foliage and two pests be destroyed at one spraying. Arsenate of lead has largely taken the place of Paris green as an insecticide, as it can be used in larger quantities. In water 5 to 7 pounds may

be used in cases of large numbers of insects and 3 to 5 pounds if used with the Bordeaux or lime-sulphur solution.

Pumps, etc., for Applying Insecticides and Fungicides

For the application of insecticides and fungicides there are a great many pumps, machines, and guns made, and any of those made by reliable and long-established firms may be relied upon to do good work if rightly handled. In every case it is desirable, if possible, other things being equal, to obtain a pump made as near home as possible, that parts may be replaced or repairs be made in case of breakage, with as little delay as possible.

Nozzles

The number of nozzles made for distributing insecticides and fungicides is as great as that of pumps, and there are many good ones. To do the best work the nozzle must discharge a fine mist-spray that will settle upon the foliage and other parts sprayed in very small particles and not run off. The one that gives the finest spray without clogging is the most satisfactory. The disk nozzles of which the "Friend" is a type are now made by most pump makers, and is generally found to be the best. The nozzle should be attached to the pole or rod at an angle of 45° for the best distribution of the spray material.

To carry the spray to the tops of trees of medium height the bamboo extension-rod or $\frac{1}{2}$ -inch brass pipe from 6 to 10 feet long can be used with success, but in spraying very tall ones the hose must be carried up into the tree and the insecticides or fungicides distributed therefrom. With a large pump worked by two men or a small engine two or three streams may be thrown at once and the work be done rapidly and cheaply.

Some Common Insects Injurious to Ornamentals

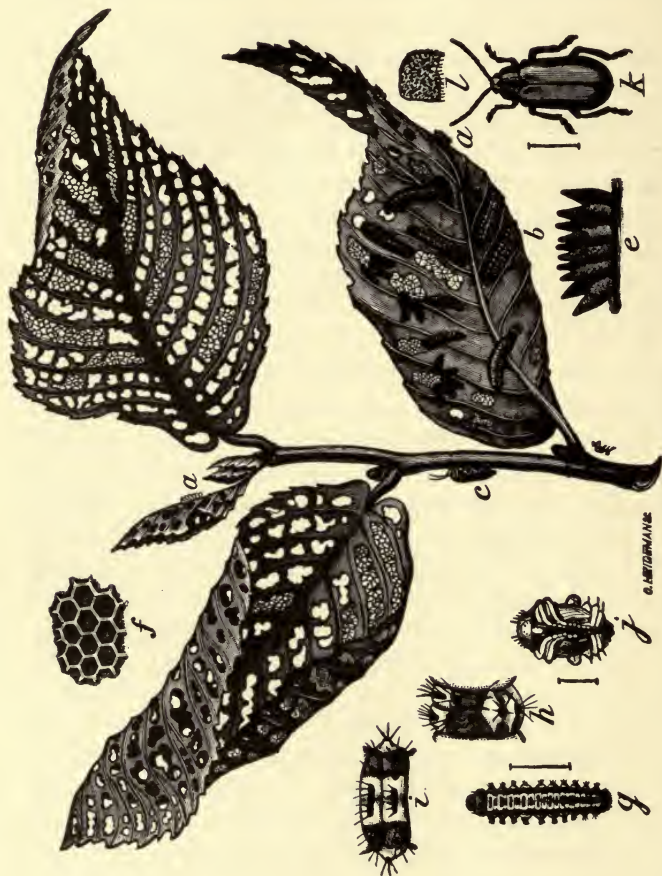


FIG. 177.—Elm-beetle.

(Riley: Annual Rep. Dept. Agr., 1883, Plate XII., Fig. 3.)

Elm Leaf-beetle (*Galeruca xanthomelæna*), Fig. 172.—This insect (*k*), a beetle of yellowish-brown color, about $\frac{1}{4}$ inch long, somewhat resembling the striped cucumber-beetle, comes

out from its hibernating places in early summer, feeds upon the foliage for a time and lays its eggs on the under side of the leaves soon after they unfold. These eggs are bottle-shaped, of orange color, are laid in clusters of from 5 to 20, and attached to the leaf by the larger end (*e*). The eggs soon hatch, and the larvæ (*g*), of a slender form, about $\frac{1}{2}$ inch long when fully grown, and yellowish-brown color with a yellow line or band along the back, feed rapidly and in from two to four weeks descend to the ground, where they pupate under some convenient shelter. In some sections of the country as many as three or four broods are reported in a season, but in northern New England it has not been proved that more than one brood matures.

Remedy.—This pest is best destroyed by spraying with arsenate of lead from 3 to 5 pounds to 50 gallons of water. The time for spraying is the last of May or early in June for the destruction of the beetles (this date will vary with location, whether North or South), and again about the middle of June for the larvæ, and if all the larvæ are not destroyed by the first spraying one or two more applications at intervals of a week or ten days should be made.

Elm-scale (*Gossyparia ulmi*), Fig. 178.—Very little seems to be known about the life-history of this insect, and yet it is one of the most widely distributed and injurious insects attacking the elm. It is a small, soft-scale insect of a whitish color (*f*) that attacks both the American and European species of the elm. It is found on the under side of the branches, and when crushed leaves a stain on the fingers or clothing much like that of iron-rust. It injures the trees by sucking the juices of the young shoots and small branches. In many sections in Massachusetts they were so abundant during the season of 1895 that the leaves and bark of almost every tree were badly covered with a black substance resulting from the dust of the atmosphere

adhering to the sticky exudations made by the insects deposited upon them, and from a black fungous growth

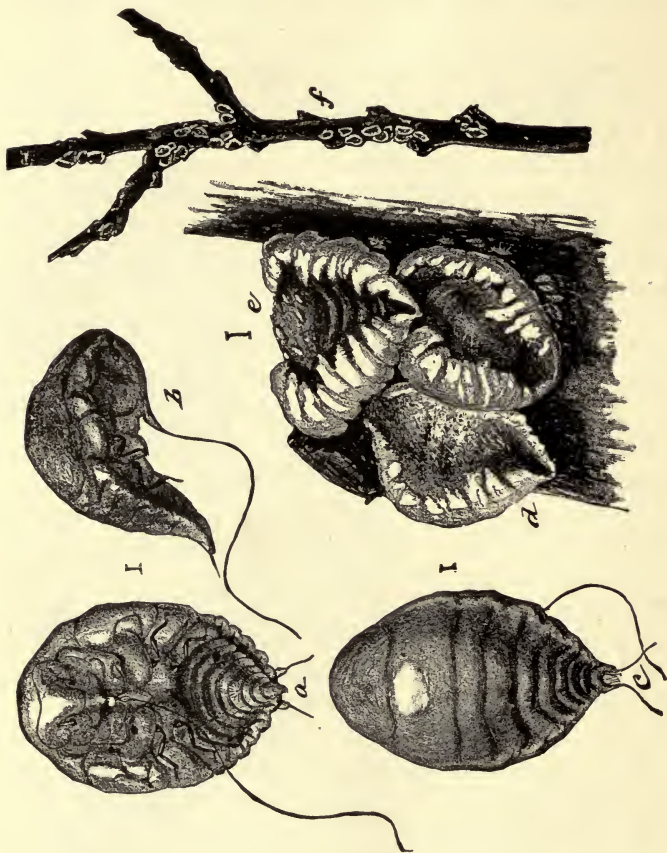


FIG. 178.—Elm-scale.
(Howard: "Insect Life," Vol. II., p. 37, Fig. 2.)

similar to that found in the exudations of the pear-tree *Psylla* in our pear orchards. The leaves were also of a sickly yellow color and the trees made a very small growth.

Remedy.—It has been found to be destroyed by the kero-

sene emulsion, applied thoroughly at the time when the young are being produced and moving from near the parent scale to other parts of the tree for permanent location, and again from five to ten days later. By close attention about June 1st the best time can be easily determined. The lime sulphur solution used at the rate of 1 gallon to 50 of water will probably also destroy it.

Maple-borer (*Plagionotus speciosus*), Fig. 179.—In most sections where the sugar-maple thrives this insect is more or less injurious, though it is said to sometimes attack



FIG. 179.—Maple-borer.

(Saunders: 5th Report U. S. Ent. Com., p. 375. Fig. 137.)

other species. It is a very dangerous insect enemy, because its work is difficult to detect until serious harm has been done. The perfect insect is a beetle nearly an inch long, the head is yellow, the thorax black, with transverse yellowish spots, and the wing-covers are yellow and black. The beetles appear in July and August, and lay their eggs on the bark during the latter part of the last-named month. The eggs soon hatch and the larvæ or young work a short distance under the surface of the bark, the first season throwing out chips and droppings from their holes. If not molested, the following season they go on feeding and working deeper through the bark and sapwood, making a tortuous burrow

not far from the surface, often nearly $\frac{1}{4}$ of an inch in diameter and sometimes girdling the tree. As many as twenty have been found in a single tree.

Remedy.—The only effectual remedy is to dig the borers out before they have done much harm, i.e., the first fall or following spring after the eggs are laid. This may be very easily done with little or no injury to the tree. The bark should be carefully scraped and after a few days the surface carefully examined, when the exuded dust or chips will enable one to quickly detect the location of the borer. If the insects have already done serious harm to the tree, all holes or channels made by them should be filled up with putty, grafting-wax, or a thick paint. Possibly the painting of the trunk with lime or Portland-cement wash containing Paris green or arsenate of lead at the rate of 4 ounces to the gallon may prove effectual in destroying many of the larvæ as they work their way into the tree.

Canker-worms (*Anisopteryx pometaria* and *Palæacrita vernata*), Figs. 180 and 181.—These insects extend over a wide area of the country, and are very injurious to the elm, apple, and some other trees. The male (*a*) insect is a grayish moth of about $\frac{1}{2}$ inch stretch of wings and flies in the night, while the female (*b*) has no wings. The female crawls up the tree and lays its eggs in clusters on the branches during the night at any time from October 15th to April 15th *when the ground is not frozen and in warm, moist nights*. The eggs hatch out about the time the buds unfold, and unless destroyed the larvæ soon eat all of the leaves but the skeleton and midrib, giving the trees the appearance as of a fire having burned off the foliage. For the past ten years this pest has done very little injury, but has again made its appearance and many cases of large injury have been reported the past season.

Remedy.—The remedy so generally used of putting bands

of tar or printer's ink, or of tin or other kind of troughs with oil in them, around the trees to prevent the female insects from reaching the branches is effectual *provided the band is kept covered with soft ink, tar or tanglefoot, or the trough is well filled with oil when the insects are moving,*



FIG. 180.—Canker-worm.

(Riley: Circular No. 9, 2d Series, Dept. Agr., Fig. 1.)

i.e., at any time when there is no frost in the ground, on warm nights from November 15th to April 15th. The more satisfactory remedy, except for very tall trees, however, is to give the insects no attention until the eggs begin to hatch out, and then to destroy the larvæ by spraying with Paris



FIG. 181.—Canker-worm.

(Riley: Circular No. 9, 2d Series, Dept. Agr., Fig. 3.)

green or arsenate of lead used as for the elm-beetle, making two applications, one when the first eggs hatch and then again in from five to eight days, according to the weather, or when all of the eggs are hatched out. Success in this work depends upon how much arsenate is used and how thoroughly the foliage is covered with it. For the amount of arsenate to use

and method of application see "Treatment of the Elm-beetle," pages 328 and 329.

Borers.—The maple-borer, Fig. 179, has already been

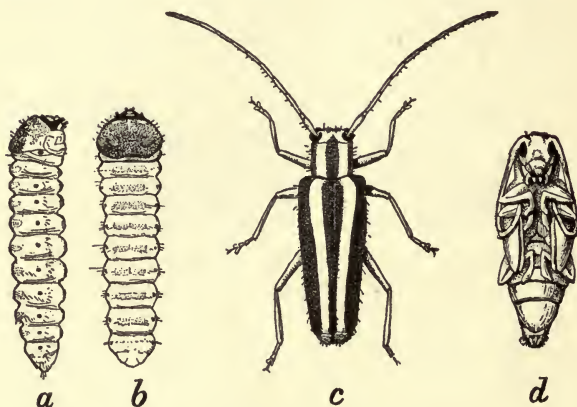


FIG. 182.—Round-headed Apple-borer.

(Chittenden: Circular No. 32, 2d Series, Dept. Agr., Fig. 1.)

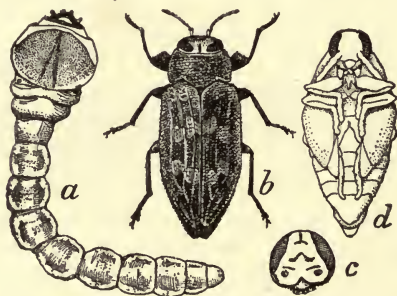


FIG. 183.—Flat-headed Apple-worm.

(Chittenden: Circular No. 32, 2d Series, Dept. Agr., Fig. 3.)

described, but there are many ornamental trees besides the maple that are injured by borers. The thorns, flowering apple, mountain ash, amalanclier (shad bush) and some other

trees are injured by the ROUND-HEADED APPLE-BORER (*Saperda Candida*), Fig. 182, and the FLAT-HEADED BORER (*Chrysobothris femorata*), Fig. 183. The flowering peach, plums, and cherries are injured by the PEACH-BORER (*Sannina exitiosa*), Fig. 184. Willows, lindens, poplars, locusts, and many other trees are also injured by borers. These are to be destroyed in the same manner as the maple-borers, i.e., by digging them out, carefully examining all trees twice each season—in June and August.

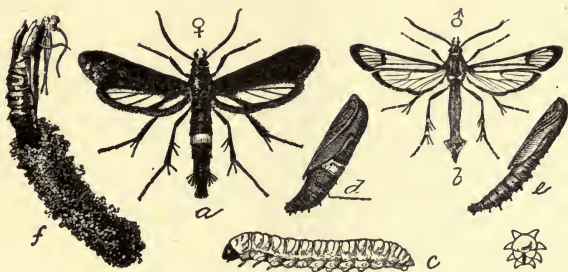


FIG. 184.—Peach-borer.

(Marlott: Circular No. 17, 2d Series, Dept. Agr., Fig. 1.)

Rose-bug or -chafer (*Macrodactylus subspinosus*), Fig. 185.—This insect needs no description, and no one insect is more injurious to so many kinds of trees and shrubs and none more difficult to destroy or prevent from doing much harm.

Remedy.—Where arsenate of lead can be safely used, as it can be upon all trees and plants producing flowers that are not cut for house or personal decoration or that produce no edible fruit, this is the most certain remedy. On roses it can be used until the blossoms are nearly open and longer if the flowers are allowed to remain on the bushes until the petals fall. Pyrethrum powder dusted over the bushes each forenoon and again late in the afternoon in bright weather

will drive the beetles away, but they soon return and the remedy must be repeated each day until they are done working. If this powder has been kept over one season or a considerable time in an open package, it loses its strength. It should always be kept in a sealed can or glass-stoppered bottle, and a fresh supply be obtained each season. Where rose-bushes are but few, these insects can be kept from

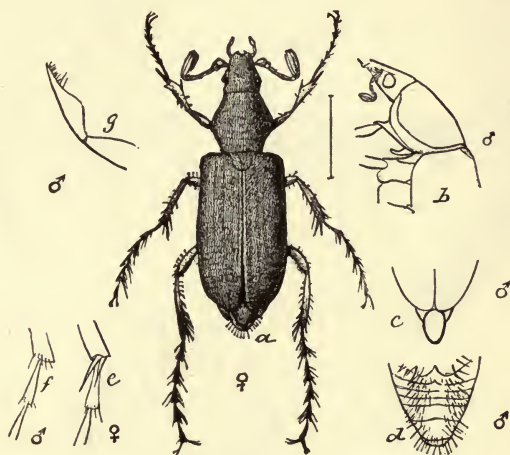


FIG. 185.—Rose-bug or -chafer.

(Riley: "Insect Life," Vol. II., p. 295, Fig. 61.)

doing serious injury by hand-picking; the easiest way to gather them being to take a broad, shallow tin basin, put in a little water with a tablespoonful of kerosene on top, hold the basin under the part of the bush examined, and touching the insects they will fall into the pan and be destroyed.

Rose-slug (*Monostegia rosea*), Fig. 186.—The rose-slug is the larvæ of one of the saw-flies. The perfect insect comes out of the ground the last of May or early in June.

The eggs are laid under the epidermis or outer covering of the leaf, and the larvæ appear in about two weeks, feeding upon the soft green parts of the leaf and leaving nothing but the midrib, veins, and epidermis on one surface. It is of a greenish color, nearly transparent, the head much larger than the posterior part of the body. It feeds rapidly and must be attended to soon after the eggs hatch.

Remedy.—Dusting or spraying with hellebore or pyrethrum powder is a certain remedy. If the dry powder is used, it must be applied when the foliage is wet with rain

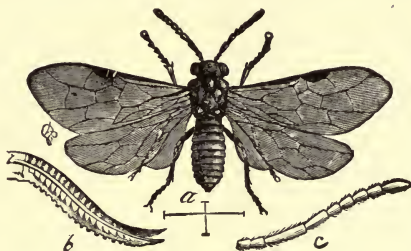


FIG. 186.—Rose-slug.

(Riley: "Insect Life," Vol. V., p. 274, Fig. 37.)

or dew. When used in water, 1 tablespoonful to a common 2-gallon pail of water is about the right quantity. It is most effective if applied just before dark in the afternoon. Also use arsenate of lead or Paris green.

Rose-leaf Hopper (*Typhlocyba rosea*).—This insect is small, almost white in color, and flies or jumps about whenever the trees or bushes are suddenly jarred. It feeds upon the green coloring-matter of the leaf, sucking out the juices, making very numerous small white spots until the leaf becomes very light green or almost white. This is the most serious rose insect and causes the dead brown leaves seen everywhere in the late summer. It is especially injurious

to the rose, grape-vine, etc., though it attacks some other shrubs and trees.

Remedy.—The remedy is thorough spraying with kerosene emulsion, or by the use of pyrethrum applied just at night it may be kept under control.

Red Spider (*Tetranychus telarius*).—This insect is so minute as to be difficult to detect with the naked eye, except by the closest inspection, until it has done considerable mischief, when its work is shown in the light green or grayish color of the leaves attacked. It works only in very dry and hot weather, when it increases very rapidly and attacks a great many kinds of trees and shrubs.

Remedy.—As this insect cannot exist in a moist, cool atmosphere, the spraying of the trees with cold water applied with considerable force is a certain remedy, a heavy thunder-shower often completely checking their work. Dusting the foliage with flowers of sulphur when the leaves are wet will also have a beneficial effect.

Aphides (*Aphis* sp.).—There is hardly a species of tree or shrub that is not more or less affected by aphides (or *plant-lice* so called). One season they are abundant and do much harm, and another very few and do little injury. These insects increase with astonishing rapidity; a single pair, it is said, may be responsible under favorable conditions of food and temperature for millions of progeny in a single season. They injure plant-tissues by sucking the juices of the tender parts, and when numerous all of the terminal shoots are stopped in growth and the tree or plant has a stunted, sickly appearance. When the leaves alone are attacked, they curl and roll up, and are soon covered with black substances collected from the dust of the atmosphere coming in contact with the sticky surface caused by the exudations of the aphides.

Remedy.—The application of kerosene emulsion with force enough to drive it under the curled leaf is the most satisfactory remedy. Strong tobacco water is also effectual in its destruction. On small trees and shrubs, where the

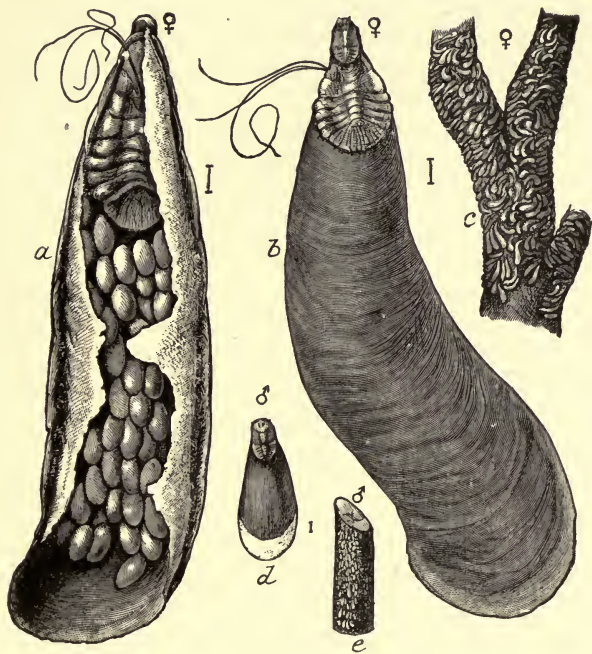


FIG. 187.—Oyster-shell Scale.

(Howard: "Year Book," Dept. Agr., 1894, p. 257, Fig. 26.)

branches can be bent down, dipping the ends into the emulsion would be most satisfactory, or the strong solution may be applied with a soft paint-brush. If only a few of the leaves are curled up these may be picked off and burned or otherwise destroyed before spraying.

Scale Insects.—These are among the most destructive of the sucking insects, and several species are very abundant. Among those most to be feared are the OYSTER-SHELL SCALE Fig. 187, and the SAN JOSÉ SCALE. The former (*Mytilaspis pomorum*), is very common on ash, willows, lilacs, hawthorn, etc., and on the flowering apples. In shape it resembles the oyster-shell, is of a brown color, about $\frac{1}{8}$ of an inch long by $\frac{1}{16}$ wide, and injures the tree by sucking the juices from the growing shoots and branches. At *c* it is shown natural size. The eggs hatch out from under the parent shell the last of June or early July, and the young swarm out and soon fix themselves on other branches, feeding at this point until they reach full size, when they die, leaving the young or eggs protected by their dead bodies.

Remedy.—This pest may be destroyed by painting during the winter with a very light coat of linseed-oil, by washing with strong caustic potash, $\frac{1}{2}$ pound to 4 quarts water, by strong whale-oil soap, 2 pounds to 1 gallon of water, applied while the trees are dormant, or by kerosene emulsion used just after the young insects have left the cover of the parent scale and have a very delicate covering. Soluble oil and lime-sulphur solution as used for the San José scale is a remedy for this pest.

The San José Scale (*Aspidiotus perniciosus*), so destructive to all kinds of fruit and many ornamental trees in California and the South, has been largely distributed about the country, having been found in every State in the Union, and has proved a most destructive pest. The perfect insect is circular in outline, of a gray color, varying from $\frac{1}{80}$ to $\frac{1}{16}$ of an inch in diameter, and generally with a black spot in the centre. It is so small as to escape notice until it has increased to great numbers, and it propagates very rapidly. It injures plant-growth in the same way as the last by sucking the juices of the tender parts.

In its earliest stage of growth it is yellow and crawls about until it finds a good place to feed, when it becomes fixed and does not move away during the remainder of its life. A single pair may produce millions of young. It attacks all of our fruit trees, currant bushes, gooseberry bushes, and many ornamental trees and shrubs. There are many species of scale insects so closely resembling this pest that when insects of this kind are found they should be sent to the experiment station entomologists for identification and suggestions as to remedies.

Remedy.—This pest has been destroyed in some cases by the same, but more concentrated, remedies as used for the oyster-shell scale. The applications should be made more thoroughly with more frequent use of the kerosene emulsion during the summer. If promptly attacked when first discovered it may be kept under control at small expense. The most effectual remedy is the lime-sulphur solution, applied in December or March, or just before the buds have started in the spring. The formulas and full directions for these applications may be found in the reports of the experiment stations, or upon application to the entomologists of these institutions.

Maple Woolly Scale (*Pseudococcus aceris*), Fig. 188. —This comparatively new insect pest has appeared in several sections of the country, but thus far has been found only on the soft maples. In Europe it is reported to be injurious to the linden, elm, chestnut, etc. (see "Bul'tin N. H. Ex. Station, No. 36"), and should it increase in this country will prove a very troublesome pest. It is somewhat of the nature of the scale and aphid, sucking the juices of the plant upon which it feeds; its body and the masses of eggs which it lays being covered with a white cottony or woolly substance, from which it takes its name.

Remedy.—While no experiments have been made, or at

least reported, to prove the value of the various common insecticides in destroying this pest, from the nature of the

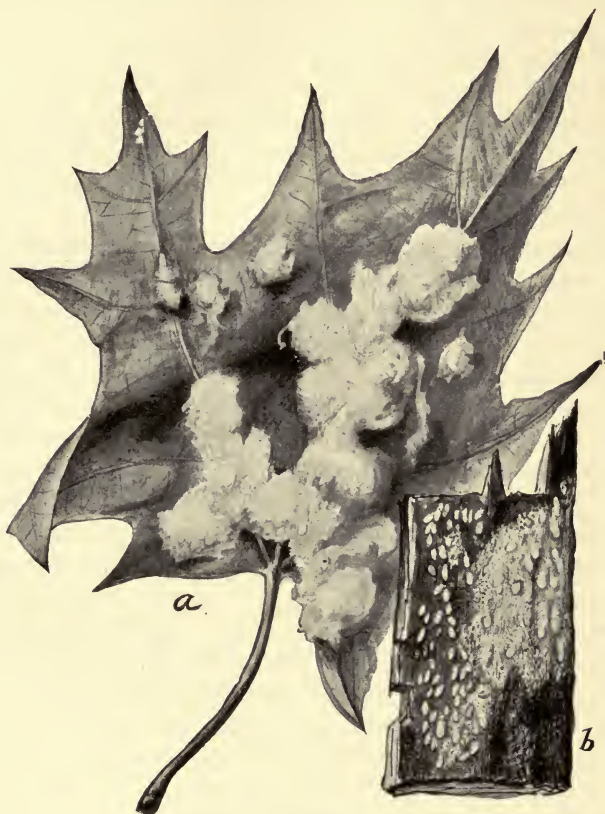


FIG. 188.—Maple-scale.

(Howard: Circular, No. 3, Dept. Agr., 2d Series, Fig. 1.)

insect it seems probable that the kerosene emulsion and soluble oil will be effectual if applied with considerable force, so as to throw it in under the mass of insects and eggs

which are so nicely protected by the woolly cover that is of a somewhat oily nature, thus preventing watery liquids from adhering to the bodies of the insects or penetrating the masses of eggs.

The Browntail Moth (*Euproctis chrysorrhea*).—A moth very similar in size to the Gypsy moth, but nearly white and more destructive in that it feeds for about a month in the fall and then again in the spring and early summer, and that the female moth can fly a great distance. The egg clusters, which are laid on the under side of the leaves on the extreme ends of the branches in August and September, are covered with brown hairs much like those of the Gypsy moth. The eggs soon hatch and the larvæ feed for several weeks, when they draw the edges of the leaves together, making a water-proof nest in which they pass the winter, and from which they come out in early May and feed on the young leaves of the oak, apple, wild cherry and a few other trees. It is destroyed by cutting and burning its "nests" during the winter, and by spraying with arsenate of lead when the leaves begin to show in the spring, or in the fall about the time the eggs begin to hatch.

The Gypsy Moth (*Porthetria dispar*).—This pest is becoming so widely distributed over New England and a few other sections that, notwithstanding the fact that the female moth can scarcely fly, it is one of our most destructive insect pests. It feeds upon most of our trees and shrubs, on the lawn, in the garden and in the forests. The work, which is almost pure white in color, lays its eggs in the early fall in brown, hair-covered clusters of from 200 to 400 in crevices of the bark, on the under side of branches, in stone walls, rail fences, sides of buildings or other secluded places. These eggs hatch out in early summer, the larvæ feed voraciously for about a month, when they go into the chrysalis state for about another month and then come

out perfect insects to lay another brood of eggs. They are destroyed by saturating the egg masses with creosote at any time during the fall and winter and by spraying with arsenate of lead as soon as they begin to feed in the spring upon the young leaves.

The Leopard Moth (*Zeuzera pyrina*).—Among the more recent insects injurious to ornamental trees and shrubs is the leopard moth. This pest was first found by Mr. R. W. Curtis, of the Arnold Arboretum, in 1909. Soon after this date it was found upon the elms and other trees in the grounds of Harvard College.

It feeds upon nearly every ornamental tree and shrub except the evergreens. Its eggs are laid singly or in small groups under the bark and in crevices of the trunks and main branches.

The young larvæ are very small, but at maturity are nearly 2 inches long. They feed upon the smaller branches, causing many of them to break off. The best remedies are spraying the trunks and main branches with a strong mixture of arsenate of lead at the time the eggs hatch, and digging out the larvæ while they are small. If discovered upon one's trees aid should be called from the experiment stations or the Entomological Bureau of the Department of Agriculture.

There are a great many other less injurious insects that often appear in small numbers on single trees or within limited localities, sometimes increasing rapidly for a time and then disappearing; but the limits of this volume will not allow of further space for their description. We may briefly say that in a general way the remedies already described may be applied to all insect pests, i.e., all chewing insects to be destroyed by the use of arsenate of lead and hellebore, and all sucking insects by the kerosene emulsion, lime-sulphur and soluble oil.

Whenever a new insect appears, if doing harm to any

crops, specimens should be sent to the entomologist of the experiment station of the State in which it is found, and the instruction given for its destruction be followed. These stations are established for the purpose of aiding the people to overcome all difficulties in the growth of ornamental or useful crops, and every citizen should feel free to ask for instruction and aid whenever needed.

Fungi Injurious to Ornamental Trees, Shrubs, etc.

The fungous growths that are injurious to growing plants belong to the group of plants known as parasitic fungi and take their food from their host plant, i.e., the plant upon which they grow, but organize no plant-food for themselves, and often they feed and grow with such rapidity as in a short time to destroy the host plant or seriously weaken it. Most of these parasites propagate from very minute seed-like bodies already described. They grow under favorable conditions with the most incredible rapidity, as may be illustrated by the short time in which the leaves of a pear or poplar tree are destroyed by the pear-blight or the poplar-rust. It often takes but a few days of warm, moist weather to cause the destruction of all of the leaves of a tree, when perhaps the growth of but a few spores only began the work of destruction. It is during hot, moist weather that they grow most rapidly, and while we may sometimes escape if we do not use fungicides, the wise gardener will be prepared and make application of the fungicides described on previous pages.

Among the many fungi injurious to ornamental trees, shrubs, etc., the following are among the most destructive:

Rusts.—This term has been applied in more or less of an arbitrary manner to a large group of fungi that produce masses of spores on the surface of the leaves or stalks, generally yellowish or brownish in color, but when of a white

color they are often called the "white rusts" or mildews. The spores germinate on the surface of the leaves, their roots or feeding-parts (called mycelia) penetrate the leaf through the stomata or breathing-pores, and after feeding and developing for greater or less time, according to the species or the condition of the weather, fruit (spores) is produced on stalks or in masses on the surface of the leaf, and scattered by the slightest breath of air. Of the true rusts I shall mention only a few of the most important, with the remedies most effective, but many others of a similar character may be destroyed or prevented from doing harm in the same manner.

POPLAR-RUST' (*Melanosporium populina*), ROSE-RUST (*Phragmidium mucronatum*), HOLLYHOCK-RUST (*Puccinia malvacearum*), LINDEN-RUST (*Cercospora microsora*).—The growth of all of these pests takes place under about the same conditions, i.e., a weakened growth of the tree or plant from any cause, and in close, moist, hot weather. Strong-growing, healthy plants are less liable to attack than those of a weak growth, though a too vigorous and soft growth may be produced by too much enrichment of the soil, and is as much to be avoided as the other extreme.

Remedy.—If copper in even minute quantities or lime-sulphur solution is on the leaves and branches so that it will be distributed over the surface whenever it rains or is wet with dew, the spores cannot germinate, and the remedy to apply is to spray the branches thoroughly with Bordeaux mixture 4, 5, 50, before the leaves unfold, when all of the earlier spores upon them will be destroyed. The great advantage of the Bordeaux mixture is that it holds the copper firmly to the leaves and with every rain or heavy dew minute quantities are dissolved and the spores are prevented from germinating. The lime sulphur used for the destruction of scale insects is also a fungicide, but can be

used only in a dilute form, $\frac{1}{2}$ to 1 gallon of the solution to 50 gallons of water, according to the kind of trees to be sprayed. To the above solutions may be added arsenate of lead 4 to 6 lbs. to 50 gallons of the mixture for the destruction of insect pests.

Leaf-blight.—The leaf-blight is unlike the rusts in that they attack and destroy small portions of the leaves, and when these spots or places of attack become numerous the whole leaf is destroyed and it soon falls off. Among the most destructive of the leaf-blight is the CATALPA-LEAF SPOT (*Phyllosticta catalpæ*), CHERRY- AND PLUM-LEAF BLIGHT (*Cylindrosporium Padi*), MAPLE-LEAF SPOT (*Phyllosticta acericolor*), SYCAMORE-LEAF BLIGHT (*Glæosporium nervisequum*), ROSE-LEAF SPOT (*Actinonema rosæ*), etc.

Remedy.—As with the rusts, the copper must be on the plants to destroy the spores when they come in contact with it, but when the parasite has become fully established nothing will destroy it that will not destroy the host plant. The treatment is the same as for the rusts.

Mildews or White Rusts.—As the name indicates, these are parasites which produce white spores and more or less white patches on the leaf or other parts. As with the two previously named groups, they grow under conditions of moisture and hot, moist weather, and as a rule they appear later in the season.

Among the most destructive of this group are the ROSE-MILDEW (*Sphærotheca pannosa*), POWDERY MILDEW OF THE HAWTHORN, PLUM, AND CHERRY (*Podosphæra oxycanthæ*), DOWNY MILDEW OF THE WILLOW (*Uncinula salicis*), DOWNY MILDEW OF THE LILAC (*Microsphæra Alni* D. C.), etc.

Remedy.—Coming on later in the season than the brown rusts, two or three applications with the Bordeaux mixture

will be effectual, but no application need be made generally until the middle or last of July. The lime sulphur is also a good remedy, 1 to 50.

Flowers of sulphur if dusted over trees and shrubs will often reduce the mildews, but not often wholly destroy them.

As with new insects, fungi new to any individual that may appear to be doing serious harm may be sent to the experiment stations for identification or for suggestions as to the best remedies.

CHAPTER XVI

THE HOME FRUIT-GARDEN

IN Chapter II some of the advantages of the fruit- and vegetable-garden to the owner of a home were briefly mentioned, and as the aim of this book is to give practical information along all lines of outdoor home ornamentation and comfort, a chapter on fruits will not be out of place, for the fruit-garden may be made to serve also as an important feature of the home ornamentation. What can be more beautiful than fruit trees when in bloom, or again when laden with highly colored fruit? And they may be trained to as perfect and beautiful forms as many of the trees used only for ornament.

The shade afforded by a broad-spreading apple-tree is quite as dense and satisfactory as that from many other species. The fruit that is obtained from the home garden is so much superior to that obtainable in the markets that it is worth a great effort and considerable annoyance to have on one's table an abundance of such choice, fresh, ripe fruit.

Size of the Fruit-garden

The amount of land to be devoted to the fruit-garden must depend very much upon size of the lot, the number and locality of the buildings, and the amount of other ornamentation attempted. For the supply of a large family with a liberal amount of all the fruits in their season will be required a garden of considerable area, though it is surprising what a quantity can be grown on a small area

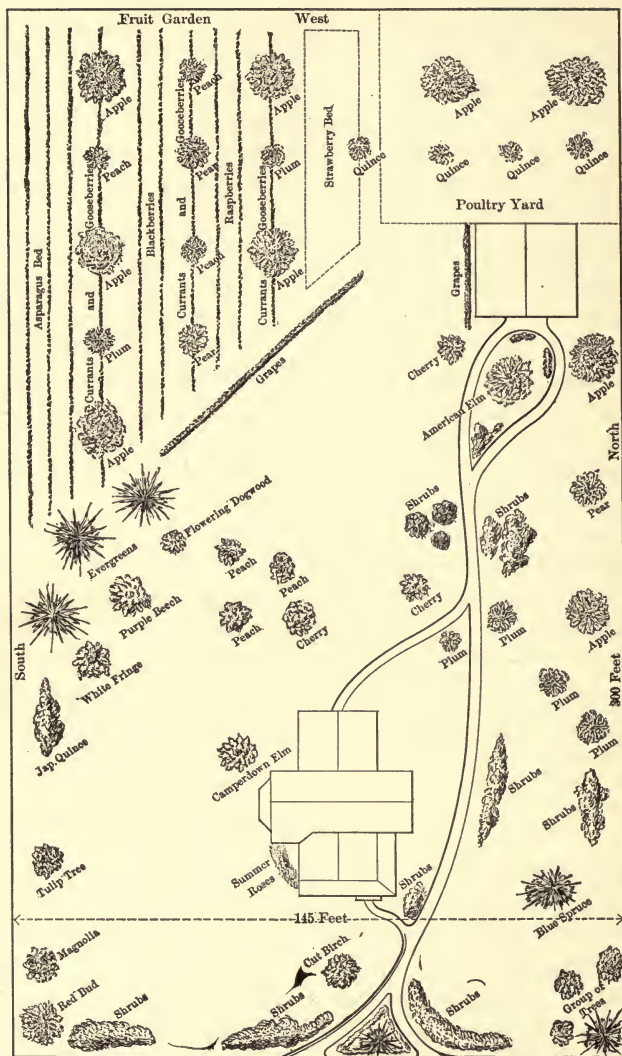


FIG. 189.—The Home Fruit-garden.

when skilfully managed. An estimate of what will be the average yield of the different kinds of fruits under the best conditions is as follows:

Apples, per tree, 30-40 ft. apart, at 10 yrs. from planting,	3 bbls.
Pears, " " 20 " " " 10 " " "	3 bu.
Plums, " " 15 " " " 8 " " "	1 to 3 bu.
Peaches, " " 15 " " " 5-10 " " "	$\left\{ \begin{array}{l} \frac{1}{2} \text{ bu. in N.} \\ \text{E., 1-2 bu.} \\ \text{so. of N. Y.} \end{array} \right.$
Cherries " " 20 " " " 8 " " "	1 bu.
Quinces, " " 12 " " " 8 " " "	1 bu.
Grapes, per vine, 8 by 10 ft. apart, at 3 yrs. from planting.....	5 lbs.
Raspberries and blackberries in rows 7 ft. apart, at 3 years from planting.....	1 bu. per sq. rod.
Currants and gooseberries, 3 by 6 ft. apart, at 4 years from planting.....	1 bu. per sq. rod.
Strawberries in rows 4 ft. apart, at 1 year from planting.....	1 to 3 bu. per sq. rd.

Location

In locating the fruit-garden that part of the lot with a suitable soil should, if possible, be selected, and be located in a rather secluded part, as more or less of the material used and some of the crops grown are not of a distinctly ornamental character in all stages of growth; besides, some seclusion is desirable when carrying on the work of planting, cultivating, fertilizing, or even harvesting the products. Fig. 189 illustrates the fruit-garden of about 1 acre located in the southwest corner of the lot.

In this garden the large and small fruits may be grown more or less grouped together, as shown in the above figure, though for the best results each kind should be planted entirely distinct from the others. The arrangements in rows as shown in the figure is made that the work of cultivating may be largely done by the horse-plough and cultivator and wheel hand cultivator.

The Soil

Much of the success of the work in the fruit-garden will depend upon the character of the soil. That which is best for the greater variety of fruits is a deep sandy loam not easily affected by drouth. Should the soil in the different parts of the garden vary, the apples, pears, quinces, and red raspberries, currants, and gooseberries should be planted on that which is the most moist; while the peach, cherry, grape, plum, and blackberry will succeed in lighter soil. Any kind of soil, however, may be improved somewhat in character at a little expense. Thus a light soil may be made more retentive of moisture by ploughing under stable manure, leaf-mould, peat, or other organic matter, while the moisture in all kinds of soil may be conserved and plant food developed by deep ploughing in the spring and frequent stirring of the surface-soil during the summer.

Very heavy soils may be improved by underdraining, by deep ploughing, by the application of sand, or by ploughing the land into beds with rounded surfaces so that the surface-water will run off quickly.

The slope of the land also affects some crops very materially: thus a southern, southeast, or southwest slope is most favorable to the growth and maturity of the grape and to the early ripening of the other fruits, while the peach, quince, and raspberry succeed better when planted on a northern exposure.

A close sheltered place is not desirable if peaches, cherries, plums, and grapes are to be grown, as fungous diseases are more liable to attack them under such conditions than if planted upon high land. The grape is less subject to late frosts in the spring or early frosts in the fall, while in low land the fruit-buds are often destroyed by these frosts.

It will often be found that the garden selected is not

suited to the growth of some of the fruits, while it is especially adapted to the others, in which case it will be found better economy to devote the space to those that do succeed, and purchase such as cannot be grown economically.

Tools

The tools required for the cultivation of a small garden are not very numerous, and the best will be found none too good and the cheapest in the end if well cared for. They should be light and strong, and after using should always be cleaned and put carefully away where they will be ready for use at any time. If the garden is of considerable size and all the work is to be done by those on the place, the following list of tools will be needed:

1 good side-hill plough and 1 small landside plough.

1 Planet Jr. cultivator with its various attachments will answer all purposes for harrow, cultivator, and marker.

1 one-horse cart or wagon will be needed unless the heavy work is to be hired done.

1 seed-drill with cultivator attachment will be found a very useful tool.

Spades, spading-forks, manure-forks, square-pointed shovels, iron rakes, wooden rakes, hand-roller, garden line and hoes, in number according to the amount of work to be done. A good wheelbarrow or hand-cart will also be found useful. See Fig. 118, the author's weed killers.

A spraying-pump of some sort must be provided for the application of insecticides and fungicides. The common hand garden-pump or the knapsack pump will be sufficient if only a few trees are to be treated, but the barrel-pump mounted on wheels will be found much more serviceable and economical in a garden of considerable size.

Arrangement of the Garden

It is generally best to have all the fruits or vegetables in the home garden grouped compactly in the rear part of the grounds, and some distance from the house, though this part of the grounds should be made to blend with the more ornamental features. Specimen trees of the large fruits may be grouped by themselves or among the ornamental trees, as shown in Fig. 189. Grape-vines, Fig. 153, may also serve to ornament the buildings, verandas, pergolas, or trellises that may screen the garden from too full exposure.

This plan shows the ornamental features of about an acre lot with the fruits grouped more or less in the rear of the house. In the garden proper are arranged 5 apple-trees, 40 ft. apart, with 2 pears, 2 plum, and 3 peaches, 20 ft. from each of the other trees, planted so that all may have clean cultivation; while on the west and north border as well as in two groups between the house and barn others are located, which must be grown in turf. These more or less blend with the ornamental trees and shrubs. On the north-east border of this garden are planted grape-vines to serve as a cover to the trellis that screens the garden from the house. Raspberries, blackberries, currants, and gooseberries are planted in rows in the line of and between the trees. The strawberry-bed is located on the north side of the orchard. An asparagus-bed is also chosen on the south side.

Turf Culture

One great advantage of close grouping, as has been stated, is that the soil about the trees and plants may be cheaply and thoroughly cultivated, thus preserving the moisture and making it unnecessary to apply as much

plant-food as if they were grown in turf. If, however, the lawn is kept mown once or twice each week and a more liberal supply of plant-food is applied, the growth of the trees will be found to be satisfactory.

Should it be found necessary to plant on turf land where a hay crop is to be taken off, much less growth must be expected and a much more liberal application of plant-food be required than where the land is cultivated, and in times of drouth a mulch of hay, straw, or other material, 2 or 3 inches in thickness, should be used under the trees as far out as the branches spread to prevent serious injury.

Where to Obtain Trees and Plants

As a rule, where only a small quantity of trees or plants is desired, it is best to buy of the nearest reliable nurseryman who has the varieties wanted growing on his grounds. Those selected should be young and vigorous, and it will generally be better for the purchaser to go to the nursery during the growing season and make his selection, having them marked for delivery when they are wanted, or if inexperienced in such matters the selection may be left with reliable nurserymen, specifying that the stock shall be of good size, *young*, and *vigorous*. Travelling agents, unless known to the purchaser, should not be patronized.

If the local nurseryman has not the stock wanted, a specific order stating the variety, age, and size of trees or plants wanted sent in early to any of the many reliable nurserymen will be certain to receive prompt attention. If the quantity ordered is not large, such orders should be sent by express, as small packages sent by freight are often delayed in transportation.

Preparation of the Land

If the land is new, i.e., if it has been in turf for some time or if under neglect, and the preparation can be begun in the fall, deep ploughing should be done by following the common plough with the trench- or subsoil-plough, whereby the soil may be loosened from 15 to 20 inches deep. This will make a light soil more retentive of moisture and a heavy soil more porous and furnish a deep and well-pulverized bed for the roots to penetrate.

Digging the Holes for Planting

In digging the holes for the reception of the trees, where the land has been deeply worked as above, only a space large enough to hold the roots fully spread out need be excavated, throwing out the subsoil, however, and replacing it with good surface-soil. On the lawn or in grass land holes considerably larger than the spread of the roots should be made and the subsoil be dug up deeply or partly thrown out if poor, and be replaced with good soil. The turf removed in digging, if any, may be placed in the bottom of the holes with good results. Holes are now made deep and with soil well loosened by the use of dynamite, $\frac{1}{3}$ to $\frac{1}{4}$ of a stick will loosen the soil but not scatter it about. These require cleaning out before the tree is set, but the soil is well loosened and trees will grow more rapidly than in holes that are dug with a spade.

Preparation of the Trees for Planting

No matter how carefully trees may be dug from the nursery, a large per cent of the fibrous roots will be destroyed and many of the larger roots be broken, and if the tree is planted without the removal of some of its branches when

it starts into growth in the spring the number of buds is so great that the supply of moisture from the roots will be insufficient to sustain a vigorous growth, and all may finally fail; while if the larger part of the branches had been removed the few buds that remain would start vigorously and sufficient moisture be supplied to sustain continuous and rapid growth until new roots and vigorous leaf-surface is formed, without which good growth cannot take place.

In pruning young fruit-trees for transplanting all branches not needed for the formation of a symmetrical head should be removed, and those remaining be shortened in more or less, according to the amount of injury to the roots. Young trees with few lateral branches are often trimmed up to a "whip-stock." This is especially the practice with peach-trees. In planting young trees the roots should be spread out as much as possible, placed at the depth they stood in the nursery, and fine rich soil worked in closely about them and tramped firmly. No chemical fertilizers should be put in contact with roots, but an abundance of finely ground bone may be used.

Planting Fruit-trees, Vines, and Plants

The best time and the methods of planting have already been discussed on pages 53 to 61, which see. All trees should have been ordered in the fall or very early in the spring, and everything if possible be in readiness for planting when the trees arrive. Trees or plants never should be planted when the soil is so full of moisture as to be sticky or compact into solid masses when pressed, but be in condition to crumble finely when turned over with the spade or plough. The subsoil thrown out in digging the holes should never be put close about the roots, but after planting be spread about on the surface and only good soil be used about the roots.

Forming the Head and Pruning

When trees are set closely and where small fruits are planted between them, the head or main branches must be carried higher than if only trees were planted in order to facilitate comfortable working among them. The main branches in this case must be started about 5 feet from the ground. On the lawn and where nothing is grown under the trees the branches may start at 2 or 3 feet from the ground unless it is desired to have them higher for shade or for obtaining views under the branches. If used as a screen, it is desirable to have them branch from the ground up, and low-headed trees are much more easily cared for, the fruit more easily gathered, and they will generally live longer.

The amount of after-pruning required, if properly formed at planting, is very small if the trees have full exposure on all sides; and if the trees are examined several times during the growing season perfect form may be produced with only the finger and thumb and a small pocket-knife, and this without the loss of any growth of wood, which would be the result if pruning is done at the end of the growing season only.

Up to the time of fruiting all the pruning fruit-trees properly cared for will need is that mentioned above; but after they begin to bear, some of the branches will often droop so much as to require removal, or they may cross one another so as to be injured, but in no case should large branches be removed when it can possibly be avoided, as every cut made on the trunk or main branches of a tree will more or less shorten its life. Broken branches should be cut back to the solid wood and all dead branches be removed, but every wound made in this work should be covered at once with linseed-oil paint, grafting wax or some other preservative. Where large branches must be removed, the saw should be

used and never the axe, as the latter cracks the wood more or less and decay will follow much more quickly than if the saw is used. In removing large branches always cut on the under side of the branch first, that when it falls the bark may not be torn from the trunk. Some of the suckers that come out along the main branches should be removed while they are soft and can be easily rubbed off, that the growth that would go into them if allowed to remain may go into the permanent growth of the tree. Some of these suckers or sprouts should be allowed to grow, especially those on the lower main branches, to renew and take the place of those that are weak.

The tops of trees that tend to grow too tall and spindling should be pinched off before they have made much growth, thus forcing the growth into the lower branches, where it is much more desired. Cuts made at the ends of the branches do little or no harm to the vitality of the tree.

The rule should be to prune from the top branches rather than from the lower branches. Many old trees are much benefited by cutting large branches from the top and center, thus forcing growth into the lower branches where they may be more easily sprayed and the fruit picked.

Special Treatment for Growing Fruits

THE APPLE

This is one of the most healthful and easily grown of all of the fruits of the temperate zone. It succeeds best in a deep moist loam and begins to bear crops of some value at from five to ten years from planting. For the best result it should be planted at from 30 to 40 feet apart, according to the variety and nature of the soil; such varieties as the Baldwin, King, Roxbury Russet, Gravenstein, etc., on rich land will need the larger space, while on a light soil the

smaller distance may be sufficient. The Fameuse, Porter, Astrachan, etc., may be planted even on a rich soil at 30 feet apart. Any of these trees may be kept within a less space if necessary by keeping the end branches headed in.

The varieties that will give the best results vary somewhat in different sections of the country, and those who are thinking of planting should consult successful growers in their own vicinity. This will apply to all kinds of fruits. The author suggests the Astrachan, Gravenstein, Baldwin, McIntosh, Wealthy, Rhode Island Greening, Sutton Beauty, and Roxbury Russet as generally succeeding.

Fertilizers.—One of the most important conditions in securing good fruit is sufficient plant-food to give the tree a moderately vigorous growth and healthy foliage. To give these results on the average soil will require, according to the size of the tree, 5 to 10 pounds of basic slag, sown in the fall or winter, 2 to 5 pounds of nitrate soda, sown just as growth is beginning in the spring, and 3 to 5 pounds of sulphate of potash, sown at any time during the winter or early spring. These materials may be mixed and sown together or put on separately; 10 to 20 pounds of finely-ground bone, according to size of tree and the soil, may be applied in place of the basic slag and nitrate of soda; 25 pounds of hard-wood ashes with from 2 to 5 pounds of nitrate of soda per tree will also make a good dressing.

A dressing of stable manure under the trees, at the rate of from 5 to 10 cords per acre, according to the soil, will also give a good growth, but some potash will also be needed. In all cases the fertilizing-materials should be spread as far as the branches extend.

If other crops are to be grown on the same land with the apple trees, as in this garden-plan, sufficient plant-food must be added to the above formula to provide for the growth of all. Either of the above formulas will be suited

for the other fruits, used at the rate of about $\frac{1}{2}$ to $\frac{3}{4}$ ton per acre, but varying them somewhat according to natural condition of the soil. If sufficient growth does not result, more fertilizer should be used, and if the growth is too great reduce the amount of nitrate.

Thinning the Fruit.—The apple, like most of our fruit-trees, has the habit of producing fruit only on alternate years, which is the result of exhaustion of the tree by its large crop of fruit, and it takes one year at least for it to regain sufficient vigor to produce another crop. To overcome this condition, the trees should be allowed to bear only a moderate crop and the land be kept in a condition to produce a moderately vigorous growth of the tree. It is the practice of many of the most successful fruit-growers to thin their apple as well as other fruit-crops so that the trees will not be weakened by overbearing. This thinning is done when the fruit is about one-third grown, removing all the wormy and imperfect fruit, and, in some cases, one-half or two-thirds of all on the tree. The result of this is that there will be little poor fruit to pick and sort; what remains will be larger and of better quality, while the quantity will probably be as great as if all had been allowed to remain on the tree, and the tree will not be exhausted, for it is the production of the numerous seeds in the fruit that weakens the tree more than the production of the pulp or soft part of the fruit.

Insects and Fungous Pests.—The limits of this chapter will not warrant a description of the many insects and fungous pests that are injurious to the apple or the other fruits, and the reader is referred to such books as Saunders' "Insects Injurious to Fruits" and "The Spraying of Crops" by Lodeman, etc., and to the directions for the use of insecticides and fungicides on pages 320-327. On these subjects the bulletins of the experiment stations give the best and

up-to-date information that can be obtained from any source. These bulletins can be had for the asking.

THE PEAR

Although the pear is not so largely grown or highly prized as the apple, it is distinctly a home fruit and is easily grown. The trees should be planted about 20 feet apart and succeed best in a rather heavy soil, but will do fairly well on any but a very thin soil if abundantly fertilized. The tree grows in a regular pyramidal form and begins bearing earlier than the apple. The treatment it requires as to preparation of tree for planting, the planting, and care are the same as for the apple and need not be repeated here.

To obtain fruit of the largest size and the best quality, the trees should make a vigorous growth and the fruit be thinned as directed for the apple. The fruit ripens better, is of better color and quality, if picked before quite ripe. The time for this work is indicated by the wormy specimens changing color and becoming mellow. For home use it is best to gather the fruit as it matures, each time picking the largest specimens while they are still hard. The varieties suggested as likely to be most satisfactory are Clapp, Bartlett, Sheldon, Bosc, Seckel, Hovey and Lawrence.

THE PEACH

The peach can be profitably grown only on high, rather light, well-drained land. It sometimes succeeds when planted on low land with a northern exposure if located near the house, where the cellar wall gives perfect drainage and the building affords some shelter from severe cold, but generally unless on elevated land the blossom buds are destroyed by severe cold in most northern sections during the winter. While it may not be advisable to plant the

peach with expectation of profit on low land, the trees cost but little, the buds sometimes escape and a single good crop from a peach-tree in the home garden will well repay the labor and care of growing and the long years of waiting. Peach-trees cannot be expected to live very long in any section of the country; the average life of the trees throughout the country is probably not more than ten to twelve years. If the land on which the trees are planted is very rich, it will be well to plant some other crop among the trees to check a too-rapid growth, or grow in turf especially while the trees are young, though when a crop of fruit has been set there is little or no danger of making the soil too rich. A moderately vigorous growth from the beginning to the end of the season gives the best and most hardy wood and the finest flavored fruit, and the latter should always be ripened on the tree, if possible, as it is much better flavored than if picked before ripe.

The best distance for planting is 15 feet apart, and the varieties that probably will give the best satisfaction are Mountain Rose, Crawford Early, Crawford Late, Elberta, Oldmixon and Carman.

THE PLUM

Although plum trees are found in most home gardens, there is but little profit or satisfaction in their growth unless one is skilful in caring for them. To succeed in their growth, the trees should have an abundance of room—15 by 15 feet or 15 by 20 feet—and be planted where there shall be a good circulation of air about them. The trees must be sprayed in the spring before the buds start, then again as soon as the blossoms have fallen, with lime sulphur 1 to 50, and arsenate of lead 3 pounds, and also when the fruit is about one-half grown with the Bordeaux mixture, one-half strength, i.e., 2 copper sulphur,

3 lime, 50 water. Then as the fruit approaches maturity the lime sulphur solution 1 pound to 50 gallons of water must be used. The black knot fungus should be cut off as soon as it appears, and if large wounds are made on the sides of the branches they should be painted with linseed-oil paint with a little kerosene in it. If the plum-curculio is abundant, it should be destroyed by spraying with lime sulphur solution 1 to 50 of water and 3 pounds of arsenate of lead.

Thorough cultivation or an abundance of plant-food rich in lime, potash and phosphoric acid must be given, especially when the trees are heavily loaded with fruit. Thinning must be practised to improve the size and quality of the fruit and save the trees from being injured by over-bearing. The fruit should be allowed to become very nearly ripe upon the trees before picking for the best quality, though for canning purposes they are sometimes picked as soon as fully grown and well colored.

The varieties that may be recommended are the Bradshaw, Lombard, Imperial Gage, Green Gage, German Prune (Fellemborg), and Damson of the European plums, and the Wickson, Abundance, Burbank, and Satsuma of the Japanese plums. The last-named variety is valuable only for canning.

In the Mississippi Valley States where the above classes of plums do not thrive varieties of the native plums should be planted. Among the best of these are De Soto, Hammer, Hawkeye, Maquoketa, Miner, Pottawattamie, Rollingstone, Surprise, Wayland, Wild Goose, and Wyant.

THE QUINCE

Two or three quince-trees in the home garden will be often a source of much satisfaction. If there is a low place about the grounds, yet where there is no standing water with especially rich soil, the quince will succeed under such conditions; 12 X 12 feet is a good distance for planting,

and it generally succeeds best where the land is frequently cultivated.

The quince is usually free from serious diseases, but in very wet and hot seasons the cedar-apple rust, leaf-blight, and fire-blight sometimes does considerable injury. Spraying thoroughly with the Bordeaux mixture before the leaves unfold and again after the fruit has set will be greatly beneficial. The flat- and round-headed apple-borers sometimes are seriously injurious, and the trees must be examined once or twice each year and the borers dug out.

The varieties suggested are the Orange, Reas, and Champion.

THE CHERRY

Very few persons succeed in growing the cherry on a small scale from the fact that the birds get the largest share of the fruit, or that the fruit as it approaches maturity is often destroyed by the brown rot if the weather is warm and moist. Very low trees, like those of the sour cherries, can be easily covered by a netting, and the birds prevented from taking all the fruit, and the use of the Bordeaux mixture while the cherries are small, lime sulphur and arsenate of lead, as for the plum, while the fruit is ripening, will largely prevent the rot.

The black aphid is the most destructive insect, causing the leaves to curl up and seriously checking the growth of the young shoots. The remedy for this pest is kerosene emulsion, strong whale-oil soap solution or strong tobacco water sprayed with sufficient force to reach the insects under the curled leaves. Where there are only a few trees the curly leaves may be picked off and destroyed, when the remaining insects can be easily reached by the spray material.

The trees will live much longer if planted in turf land than if in cultivated garden soil, and as they make very

regular and shapely trees are well suited for growth upon the lawn or by the roadside. The amount of fertilizers needed is what is just sufficient to make a fairly vigorous growth, too rapid growth often resulting in the cracking of the trunk on the south side and an early decay of the tree.

Among the best varieties may be mentioned Napoleon, Gov. Wood, Black Tartarian, and Windsor of the sweet cherries, and Early Richmond and Large Montmorency of the sour kinds. The fruit should be gathered in dry weather and be picked with the stems attached, so that it shall not be crushed or bruised; otherwise it will decay quickly after gathering.

THE GRAPE

This is especially a home fruit, from the fact that it can be grown on a lot of the smallest size, as it can be trained over the veranda or porch, upon a trellis along the side of the house or stable, walls or rocks with a southern exposure, and produce a large quantity of the most delicious and healthful fruit. It succeeds best in a very warm location and in rather poor soil, but if planted where it is close and moist, with but little air and sunlight, it is sure to be attacked by mildews, rots, and anthracnose. The conditions of success in growing the grape are a moderately vigorous growth of vine well spread out to the full sunlight and air; forcing the growth into a few canes—those bearing the fruit the present season and those that are to bear the fruit the next season—all other parts of the vine being prevented from growing by pinching as soon as they have made one new leaf after the last pinching; and thinning the fruit so that the vines shall not be exhausted by overbearing. The fruit is borne on the wood of the present season's growth, and the more vigorous this growth the larger will be the size of the bunches and the quantity of fruit.

The best support for the vines to run on is made of No. 14 or 16 galvanized iron wire, as the tendrils of the vines will cling to this, it is less expensive, and the vines require less tying to keep them in place than if trained to a wooden trellis. If trained against the building, the vine should be kept 6 to 10 inches from the wall, that the air may better circulate among the leaves and fruit, thus preventing disease of the vine and the decay of the woodwork.

In very wet seasons mildew will attack the leaves, and rot and anthracnose the berries, and spraying becomes a necessity to insure a crop under these unfavorable conditions. The Bordeaux mixture should be used up to the time the fruit is one-half grown, making two applications according to the weather.

Among the best varieties for sections north of New York City may be mentioned, Concord, Campbell's Early, Worden, Winchell (*Green Mountain*), and the Delaware. South of this latitude many other choice kinds may be grown.

THE BLACKBERRY

Of all garden-fruits none is so easily grown and yet so often a failure as the blackberry. The conditions of success are a good new soil, if not a deep sandy loam, then a deep well-underdrained clay loam. Plant in the fall or very early in the spring in rows from 6 to 8 feet apart or in hills 4 by 6 feet, allowing a space of from 10 inches to 1 square foot for each cane, and all suckers not desired for the next season's fruiting must be treated as weeds. It is best to allow the suckers not wanted to grow 6 inches to 1 foot, and then pull them up rather than to hoe or cut them off. The critical time of growth is when the fruit is ripening, a large amount of moisture being needed to produce the best fruit, and to secure this the surface-soil should be stirred once or twice each week or a mulch of

hay, straw, or other material 2 or 3 inches thick be spread over the surface. At the end of the fruiting season the old canes should be cut out and the small weak new canes be cut or pulled, so that the whole growth may be forced into the canes for the next season's fruit. It is the practice of most growers to pinch the ends of the new canes when they are 3 to 4 feet high, which causes them to grow more stocky and require less support. In the more northern sections the canes are bent over and covered lightly with soil to prevent winter-killing. This is a simple matter, and the canes need not be broken if the soil is loosened a little on the south side with a spading fork and they are bent over with a strong pulling motion. They should be bent over toward the south, that the sun during the winter may not strike them with direct rays, and should be uncovered and placed upright as soon as the frost is out of the ground in the spring, as they start into growth earlier when lying on the ground than if standing upright and are thus less liable to be injured by late frosts.

To keep the canes upright when loaded with fruit, they may be tied to stakes or be supported by tying the canes in from opposite sides, one cane thus supporting the other. No. 14 or 16 wires stretched on each side of the rows from 12 to 15 inches apart serve as good supports. When grown on a strong soil, the canes if made to branch by pinching will be large enough to stand up without support.

The varieties that succeed at the north are the Agawam, Snyder, Eldorado and Taylor, while further south the Early Harvest, Wilson, and Erie may prove more satisfactory.

Under good cultivation the blackberry is very little troubled by insect or fungous pests, but it will generally be best to spray the bushes before they start into growth and again just before the blossoms open with the Bordeaux

mixture for the leaf-blight, rust, and anthracnose, which are sometimes destructive in very moist and warm weather, especially if the growth is rather weak.

THE RASPBERRY

The raspberry is successfully grown under about the same conditions as the blackberry, but perhaps needs a somewhat richer soil, and as the canes make a shorter growth may be planted a little closer, i.e., in rows 5 to 6 feet apart or in hills 3 by 6 feet. The fruit of the red raspberry should be gathered every day, for if allowed to remain long on the bushes after ripening it is attacked by insects and decays quickly in moist weather. The pruning, training, and care are practically the same as for the blackberry, and clean cultivation or mulching rather more of a necessity.

The varieties that will probably give the best results are the Cuthbert, Loudon and Herbert.

THE CURRANT AND GOOSEBERRY

There is scarcely a home garden to be found in which an attempt is not made to grow the currant, but in most cases the bushes are planted in some out-of-the-way place where they suffer from neglect, and the fruit, while of some value for making jelly, is not desirable for table use because of its small size and seedy character. There is no fruit that can be improved so much in size and quality by good cultivation as the currant.

Vigorous young plants one or two years old should be planted in rich, rather moist soil in hills 4 by 6 feet apart. Thorough and clean cultivation must be given and an annual dressing of two or three shovelfuls of good stable manure be put about the bushes in the fall or an equal value of some good fruit-fertilizer be applied in the spring. This fertilizer should be put at least 2 feet from the crown of the

plants, as if put close up to them it causes weeds and grass to grow in among the canes which are difficult to get out.

The pruning needed consists in cutting out the old wood, i.e., that more than three or four years old, in such a way as to give the bushes an upright form and produce young and vigorous wood, upon which only large and fine fruit can be grown. During the time of ripening much fruit will be saved from being spattered with soil if a mulch of 2 or 3 inches is put around under the bushes.

For home use the best varieties are the Wilder, Red Cross, White Imperial and Diploma.

The currant-worm is the only insect seriously injurious to this fruit, but unless it is destroyed will generally ruin the crop. It comes on with the early unfolding of the leaves, works rapidly, and requires only a few days to completely denude the bushes of foliage. Close watch must be kept, and at the first appearance of this pest powdered hellebore must be applied while the leaves are wet or be put on in water, a large tablespoonful to a pail of water, with the watering-can or spraying-pump. A second brood of these insects appears in about two weeks from the first, when a second application of hellebore is necessary.

Spraying with the Bordeaux mixture just before the blossoms open, and again after the fruit has been picked, will prevent the leaf-blight that often seriously weakens the bushes.

The *gooseberry* requires the same treatment as the currant, but must be planted in a rather more airy place to prevent the mildew that often ruins the fruit. Spraying with the Bordeaux mixture will sometimes prevent this disease. If the currants and gooseberries are planted together, the first brood of the currant-worms will be found largely on the latter while the second brood will be on the former only.

Varieties recommended are, Columbus, Downing, Josselyn.

THE STRAWBERRY

This is pre-eminently a home fruit, because it is so easily grown, comes into bearing at one year or less from the time of planting, and produces a large quantity of fruit that is much superior to that which may be found in the markets. All that is required for success is a deep, rich, new soil, thorough cultivation, and a good supply of moisture at the time of ripening. A yield of one bushel of fruit to the square rod is of very common occurrence, while two or three bushels are sometimes produced under the most favorable conditions. A clover sod turned under makes about the best condition, but the soil should be cultivated at least one,

a a a a a a a a a a a a a a a a a
x a x a x a x a x a x a x a x a x
a a a a a a a a a a a a a a a a

FIG. 190.

and better two years with some hoed crop to drive out the white grub, the larvæ of the May beetle. Unless this is done these grubs will eat all of the roots on the newly set plants. The land should be made rich by ploughing or spading under manure at the rate of from 10 to 15 cords per acre, and be made fine and mellow before planting. To this amount of manure should be added, at the rate of from $\frac{1}{4}$ to $\frac{1}{2}$ ton per acre, any good fruit-fertilizer, and after being thoroughly worked in to the surface soil the plants be set as early in the spring as the land will work up fine and mellow.

The plants—only young plants with white roots should be used—may be set in rows from 3 to 5 feet apart and from 1 to 3 feet in the rows, according to the system of growing practised. The best berries, perhaps, and a large quantity of them, will be produced if the plants are set 2

feet by 3 and three rows of runners be rooted, as shown in Fig. 190, where *x* illustrates the old plants and *a* the new plants. Every fourth row is left unplanted for a path. After the bed or row has thus been established all other runners must be pulled or cut off as soon as started, and the land be kept cleanly cultivated up to the time the ground freezes in the fall.

During the winter the bed should be covered with a light mulch of hay, straw, or other material, *free from weed-seeds*, to prevent the alternation of freezing and thawing when the ground is not covered with snow. In the spring after growth begins this covering should be drawn from the crowns of the plants into the space between the rows, where it will serve as a mulch and protect the fruit from becoming covered with soil during heavy rains.

All weeds that appear in the spring must be pulled out by hand, as stirring the soil with the hoe at this time is not advisable.

The varieties are so numerous and vary so much under different kinds of soil and location that no list of varieties of much value can be given that will be successful in all locations, and the reader should consult some successful grower in his vicinity and plant the varieties found most valuable. The varieties suggested that may be generally satisfactory are the Minute Man, Brandywine, Sample and the Marshall under high culture.

The insects or fungous growths that are seriously injurious to the strawberry may be largely overcome by thorough and clean cultivation.

INDEX

A

	PAGE
Abele, silver poplar.	176
Actinidia.	263
Advantages of home garden.	349
mixed hedges.	89
Alternanthera.	296
Alyssum.	296
Amaranthus.	296
Amount of land required.	16
Andromeda.	253
Anemone Japonica.	273
Aphides.	338
A plan of ornamentation.	2
Apple-borers.	334
Apple, best varieties.	360
, Chinese double-flowering.	179
, fertilizers for.	360
, insects and fungi injurious to.	361
, Parkman's double-flowering.	179
, pruning.	358
, thinning the fruit.	361
Apple-trees for shade.	358
Aquatic border-plants.	315
plants.	304-315
Aralca, Hercules'-club.	218
, Japanese.	218
Arbor-vitæ, American.	211
, globe.	212
, golden.	212
, pyramidal.	212
, Siberian.	212
Architecture of the house.	20

	PAGE
Arrangement of fruit-garden.....	354
rooms.....	26
trees and shrubs.....	62-81
for shelter.....	63
screens.....	64
Arrowhead plant.....	308, 315
Artificial system of decoration.....	5
Ash, American.....	160
, aucuba-leaved.....	175
, European.....	175
, weeping.....	193
Asters, native.....	273
Avenue-trees.....	155
, lists of.....	155
Average yield of fruits.....	351
Avoid too close planting of hedges.....	85
trees.....	67
Azalea, flame-colored.....	216
, Ghent.....	217
, Japanese.....	217
, pink.....	216
, Vaseyii.....	216

B

Back-yard decoration.....	135-139
Balsams.....	297
Banana, Anyssinian.....	304
Bank walls, removal and covering.....	110-111
Barberry, purple-leaved.....	218
, dwarf, Thunberg's.....	219
Bedding-plants.....	295
Bedding-roses.....	242-243
Beech, American.....	174
, copper-leaved.....	199
, European.....	175
, fern-leaved.....	197
, Rivers' purple.....	199
, weeping.....	193
Birch, canoe.....	169
, cherry or sweet.....	170

	PAGE
Birch, European white	170
cut-leaved weeping	190, 191
, gray	170
, purple-leaved	198
, Young's weeping	190
Black walnut	162
Blackberries	367
Bladder-fern	317
Blight, catalpa leaf	347
, cherry-leaf	347
, maple-leaf	347
, plum-leaf	347
, remedy for	347
, rose-leaf	347
Bloodroot	274
Blue-gum tree	304
Blue spruce, Colorado	206
Bordeaux mixture	326
Bordering walks with turf	39
Borers, apple	334
, maple	331
, peach	335
Box-elder	165
Boxwood	250
Broken-stone road	120
Buckthorn	268
Buildings, location of	17
, relocating and improving old	104
Bulletins relating to insecticides and fungicides	321
Bulrush	315
Bur-marigold	315
Burning Bush	225
Bur-reed	315

C

Cacti	304
Caladium	303
Calendula	297
Calliopsis	297
Calycanthus	220

	PAGE
Camperdown elm.....	195
Canary-bird flower.....	299
Canker-worm.....	332
Canna.....	300
Carnation.....	288
Careful study of art of landscape gardening.....	3
Care of cemeteries.....	149
roads.....	119
Castor-bean.....	302
Catalpa.....	171, 199
Catalpa-blight.....	347
Cat-tail.....	315
Cedar, prostrate.....	209
, red.....	207
Cellar, drainage of.....	23
Cemeteries, care of.....	149
Centaurea, dusty-miller.....	296
Character of land.....	20
Characteristics of trees.....	51
Cherry, care and cultivation of.....	365
, flowering.....	172
, Japanese weeping.....	192
Cherry-blight.....	347
Cherry-mildew.....	347
Chestnut, American.....	170
, horse.....	169
China-wood.....	175
Chinese cork-tree.....	181
wistaria.....	263
Christmas ferns.....	317
Cinnamon ferns.....	317
Clematis, Japanese sweet-scented.....	259
, purple.....	258
, Virginian.....	258
, white.....	259
Climbers, hardy.....	253
Climbing roses.....	244
tender plants.....	299
Clipping lawns.....	41
Close-planting, avoid.....	67

	PAGE
Closet-room, abundance of.....	27
Cobea vine.....	299
Coffee-tree, Kentucky.....	175
Coleus.....	296
Colorado blue spruce.....	206
Colored foliage, trees with.....	198
Columbine.....	275
Conditions for a good road.....	119
Construction of farm-roads.....	117
roads.....	101
walks and drives.....	95
Convenience in location of house.....	17
Copper sulphate.....	325
Cork-tree, Chinese.....	181
Cost of house.....	22
Covering bank walls.....	110-111
wounds on injured trees.....	51
Cranberry-shrub.....	241
Cucumber tree.....	163
Cultivation of fruit trees.....	354
, too much land.....	114
Currant, care and cultivation.....	369
Curves of walks and drives.....	99
Cut-leaved ash.....	196
beech.....	196
birch.....	190
green Japanese maple.....	196
oak.....	196
pæonia.....	286
purple Japanese maple.....	196
silver maple.....	190
sumac.....	232
variegated Japanese maple.....	196
Cypress, Japanese.....	210
thread-like.....	211
Cypress-vine.....	299

D

Dahlia.....	294
Daphne.....	223

	PAGE
Day-blooming water-lilies	312
Day-lilies	276
Deciduous trees, improving	106
Decorating farm-homes	114
school-yards	141
Decoration, home and landscape-gardening	1
Description of trees	153
Deutzia, double-flowered	223
, slender	223
Digging holes for planting trees	356
trees for planting	57
Direction of walks and drives	98
Distance for planting trees and shrubs	53
Dogwood, flowering	173
red	173
, red	221
, weeping	192
Drainage of cellar	23
surface- and sub-soil	24

E

Elder	235
Elevation of house	19
land for home	9
Elm, American	155
, Camperdown	195
, European	159
leaf-beetle	328
, Scotch	188
, slippery	159
Elm-scale	329
Emulsion, kerosene	323
Eschscholtzia	296
Eulalia, Japanese	318
Evergreen shrubs	249
, list of	250
trees	203
, improving and pruning	203
, list of	205
Exochorda	226

	PAGE
Exposure of house.....	19
Extent of walks and drives.....	113

F

Farm-homes, decoration of.....	114
Fences and walls, removal of.....	111
Ferns, bladder.....	317
, Christmas.....	317
, cinnamon.....	317
, hardy.....	317
, maidenhair.....	317
, ostrich.....	317
, rattlesnake.....	317
, rock.....	317
, wall.....	317
Fertilizers for apples.....	360
home fruit-garden.....	360
lawn.....	42
strawberries.....	371
trees and shrubs.....	62
Feverfew, golden.....	296
, hardy.....	290
Filbert, purple.....	221
Fir, Nordmann's.....	207
Flag, variegated.....	314
Flowering plants, tender.....	93
Forms of hedges.....	87
Fraxinella.....	276
Fruit-garden, arrangement of.....	354
, home.....	349
, location of.....	351
, plan of.....	350
, size of.....	351
Fruit-trees along roadways.....	129
Fungi and fungus-destroyers.....	324
, nature of, and condition of growth.....	324
Fungicides.....	324
Fungi injurious to ornamentals.....	345

G

	PAGE
Geraniums.....	295
German iris.....	279
Gladiolus.....	295
Globe arbor-vitæ.....	212
Golden arbor-vitæ.....	212
oak.....	202
poplar.....	199
Golden-bell.....	226
, Fortune's.....	227
, weeping.....	227
Golden-glow.....	290
Grade, how to obtain.....	30
Grading about buildings.....	34-36
, preliminary.....	29
Grape, importance of.....	366
, methods of cultivation, pruning, etc.....	366
, varieties of.....	367
Grass for lawn.....	37
Grass-seed, quantity of.....	38
Grouping or arrangement of trees.....	62-81
trees for ornamentation.....	66
, nature as a guide.....	67

H

Hardy climbers.....	253
ferns.....	317
, list of.....	317
herbaceous plants.....	273
, transplanting.....	107
Harris's lily.....	283
Hawthorn.....	173
Hawthorn mildew.....	347
Healthfulness of home location.....	8
Heating the house.....	26
Hedges.....	85
, forms of.....	87
of flowering shrubs.....	272
, plants, list of.....	267
, renewing.....	106

	PAGE
Hellebore.....	323
Hemlock.....	267
Hercules' club.....	218
Hibiscus.....	227
Hickory, white.....	162
Holly, American.....	250
Hollyhock.....	277
Hollyhock-rust.....	346
Home, decoration of.....	5
, decoration of farm.....	114
, location of.....	7
Honey-locust.....	175
Honeysuckle, Japanese.....	260
, Tartarian.....	230
Hop-tree.....	183
Horse-chestnut, common.....	169
, red-flowered.....	169
House, architecture of.....	20
, elevation of.....	19
, exposure of.....	19
, heating of the.....	26
, location of.....	17
Hyacinth, water.....	313
Hydrangea, hardy.....	227
, tender.....	270

I

Implements for pruning.....	89
Importance of evergreen trees.....	203
hardy climbers.....	90
shrubs.....	214
walks and drives.....	95
Improperly located buildings.....	111
walks and drives.....	112
Improvement of evergreen trees.....	107
Improvement of roads.....	113
roadsides.....	125-133
Improving deciduous trees.....	47
old homes.....	104
Increase in value from ornamentation.....	16

	PAGE
Indian currant.....	239
Injury caused by fungi.....	324
insects.....	320
Insecticide.....	321
, bulletins relating to.....	321
Insects, common injurious.....	328
Introduction.....	v-vii
Iris, German.....	279
, Japanese.....	278

J

Japanese anemone.....	273
aralia.....	218
azalea.....	217
clematis, sweet-scented.....	259
cypress.....	210
, thread-like.....	211
hydrangea.....	227
iris.....	278
lilies.....	282
maples.....	167-169
plume grass (Eulalia).....	318
quince.....	222
roses.....	247
snowball.....	241
sumac.....	235
tree-lilac.....	240
woodbine.....	256
Juniper (red cedar).....	207
, prostrate.....	209

K

Keeping up aftergrowth of trees, etc.....	62
Kentucky coffee-tree.....	175
Kerosene emulsion.....	323
Kind of soil for home grounds.....	19
Knowledge of materials for ornamentation.....	2
Kokwa.....	263

L

	PAGE
Laburnum.....	173
Land, amount needed for home ornamentation.....	16
, elevation and slope of.....	9
, strongly marked features of.....	11
Landscape gardening and home ornamentation.....	1
, a careful study of the art needed.....	3
Laurel, great.....	251
, mountain.....	250
Lawn, clipping the.....	41
, dressing and renewing.....	42
, fertilizers for.....	42
, grading about building.....	26-36
, grass and fertilizer on old.....	109
, importance of the.....	33
, made of turf.....	40
, making surface of.....	34
, manuring the land for.....	33
, mowers for cutting the.....	41
, quantity of grass-seed for.....	38
, renovating old.....	108
, reseeding the.....	43
, settling the soil.....	37
, sowing grass-seed on.....	39
, time for seeding.....	38
Lawn-grasses.....	37
Laws relating to ornamental trees.....	126
Leaf-blight of catalpa.....	347
cherry.....	347
maple.....	347
plum.....	347
sycamore.....	347
Leaf-spot of the rose.....	347
Lilac, common.....	239
, downy.....	240
, Japanese.....	240
, Josikea.....	240
, Persian.....	239
Lilac-mildew.....	347
Lilies.....	281

	PAGE
Lily, Bateman's.....	283
, Easter.....	282
, golden-banded.....	281
, hardy water.....	309
, Harris's.....	283
, lance-leaved.....	282
, long-flowered.....	283
, plantain.....	276
, tender water.....	311
, Turk's cap.....	283
Lily-of-the-valley.....	293
Linden, American.....	182
, European.....	182
, white-leaved.....	183
Linden-rust.....	346
List of aquatic plants.....	308-309
avenue-trees.....	155
colored-leaved trees.....	198
cut-leaved trees.....	195
deciduous shrubs.....	215-216
evergreen shrubs.....	249
trees.....	205
hardy climbers.....	256
ferns.....	317
hedge plants.....	267
ornamental grasses.....	318, 319
rounded-headed trees.....	164
tender bedding-plants.....	295
climbers.....	299
weeping trees.....	190
Location and extent of walks and drives.....	95
of buildings.....	17
of fruit-garden.....	351
of home, convenience of.....	8
, healthfulness.....	8
, near schools, etc.....	9
, on main or side street.....	9
Locust, honey.....	175
Lotus, species.....	309

M

	PAGE
Macadam or broken-stone road.....	120
Magnolia, cucumber.....	179
, showy.....	179
, Soulange's.....	179
, swamp.....	181
, umbrella.....	179
Maidenhair fern.....	317
Making surface of lawn.....	34
Manuring the land for lawn.....	33
strawberries.....	371
Maple, English.....	165
, Japanese.....	167, 169, 195, 196, 198
cut-leaved green.....	196
purple.....	196
variegated.....	196
golden.....	202
purple-leaved.....	198
, Norway.....	165
, red.....	167
, Reitenbach's.....	198
, Schwedler's.....	165, 198
, silver.....	160
, sugar.....	160
, sycamore.....	166
, Tartarian.....	167
, Wier's cut-leaved.....	190
Maple-borer.....	331
Maple-scale.....	341
Marigold.....	296
Mignonette.....	297
Mildew.....	347
of cherry.....	347
hawthorn.....	347
lilac.....	347
plum.....	347
rose.....	347
willow.....	347
, remedies for.....	347
Mist-plant.....	232

	PAGE
Mock-orange, fragrant.....	230
, golden.....	232
, large-flowered.....	232
Mountain ash, American.....	183
, European.....	183
, oak-leaved.....	183
laurel.....	250
rhododendron.....	252
Mulberry.....	181
, weeping.....	194

N

Nasturtium.....	296
Natural <i>vs.</i> artificial systems.....	5
system explained.....	5
Nature as a guide in planting.....	78
Nelumbo, East Indian.....	309
, Egyptian.....	309
, native.....	309
, striped Japanese.....	309
, white Japanese.....	309
Night-blooming water-lilies.....	312
Nordmann's fir.....	207
Norway maple.....	165
spruce.....	205
Nozzles for spraying-pumps.....	327

O

Oak, chestnut.....	187
, English.....	187
, cut-leaved.....	187
, fern-leaved.....	187
, golden-leaved.....	202
, purple-leaved.....	187, 202
, pyramidal.....	187
, variegated.....	187
, pin.....	186
, red.....	160
, scarlet.....	187

	PAGE
Oak, swamp white.....	185
, white.....	185
Old trees, improving.....	47
Ostrich fern.....	317
Oyster-shell scale.....	340

P

Pampas-grass.....	318
Pansy.....	297
Papyrus.....	303
Paris green.....	321
used dry.....	321
with Bordeaux mixture.....	321
plaster, flour, etc.....	321
water.....	321
Parkman's flowering apple.....	179
Parks and public squares.....	137
Parrot's feather.....	315
Pea, sweet.....	298
Peach-borer.....	335
Peach, best varieties.....	363
, flowering.....	178
, land best suited for growth of.....	363
Pear, best varieties.....	362
, land best suited for.....	362
Peony, Chinese.....	286
, cut-leaved.....	286
, tree.....	285
Pepper-bush, sweet.....	220
Persian insect-powder.....	323
lilac.....	239
Petunia.....	296
Phlox, garden.....	286
, (moss-pink).....	287
Pickrel-weed.....	315
Pin oak.....	186
Pine, Austrian.....	209
, long-leaved.....	209
, stone.....	209
, white or Weymouth.....	209

	PAGE
Pink, carnation.....	288
moss.....	287
Plan of arranging ornamental trees.....	45
Plan of fruit garden.....	350
house.....	21
strawberry-bed.....	371
Plane-tree.....	176
Planting fruit-trees for ornament.....	116
in home garden.....	351
ornamental trees.....	59
unprofitable land with ornamental and forest trees.....	116
Plum, best varieties.....	364
, cultivation of the.....	363
, flowering.....	178
leaf-blight.....	364
, purple-leaved.....	200
Plum-mildew.....	364
Flumbing.....	28
Plume-grass, Japanese common.....	318
zebrina.....	318
gracillema.....	319
variegated.....	318
Poplar, black.....	177
, Bolles'.....	176
, golden.....	199
, silver.....	177
, Lombardy.....	177
Poplar-rust.....	346
Poppy, oriental.....	289
, plume.....	288
, water.....	314
Porcupine-plant.....	314
Portulacca.....	296
Preparation of land for fruits.....	356
ornamental trees.....	55
shrubs.....	85
Preserve choice native trees and shrubs.....	128
Privet.....	268
Prostrate juniper.....	209
Pruning hedges.....	88

	PAGE
Pruning hedges, implements for	89
, time for	89
old trees	50
roses	242
shrubs	84
trees for transplanting	57
Pumps for the use of insecticides and fungicides	327
Purple clematis	258
Purple-leaved barberry	218
beech	199
birch	198
filbert	221
maples	198
oak	187
Pyramidal arbor-vitæ	212
Pyrethrum	290
Pyrethrum-powder	323

Q

Quince, best varieties	365
, common	364
, Japanese	222

R

Raspberry, best varieties	369
, cultivation of	369
Rattlesnake fern	317
Redbud	173
Red cedar	207
dogwood	221
oak	160
spider	338
Red-fruited elder	235
Red-twigged willow	182
Reitenbach's maple	198
Removal of fences and walls	111
Renewal of old evergreens	107
Renewing old shrubs and hedges	106
Renovating old cemeteries	149
Reseeding lawns	43

	PAGE
Retinispora filifera.....	211
picifera.....	210
Ribbon-grass.....	319
Rivers' purple beech.....	199
Roads, and roadside improvements.....	125
, broken stone or macadam.....	120
, conditions necessary for good.....	119
, construction.....	101
of farm.....	117
, repairing.....	123-124
, surface of.....	121
, width of.....	123
Roadsides, as a dumping-place.....	126
, care of trees along.....	126
, fruit along.....	116
, improvement of.....	125
, laws relative to trees along.....	126
, ornamental shrubs along.....	129
, removal of fences along.....	133
Rocks and ledges in ornamental grounds.....	11
Rocky Mountain columbine.....	375
Rose, insects injurious to the.....	335-339
Rose of Sharon.....	227
Roses.....	241
, bedding.....	242
, climbing.....	244
, Japanese.....	247, 268
, moss.....	247
, pruning.....	242
, varieties.....	242
, winter protection.....	242
, yellow.....	244
Rose-chaffer.....	335
Rose-flowered water-lilies.....	309
Rose-leaf hopper.....	337
Rose-mildew.....	347
Rose-rust.....	346
Rose-slug.....	336
Round-headed trees, list of.....	165
Rudbeckia.....	290

	PAGE
Rules for grouping trees.....	68
Rust, hollyhock.....	346
, linden.....	346
, poplar.....	346
, rose.....	346
, remedy for.....	346

S

Salvia, scarlet.....	296
Salvinia.....	314
Scale insect, oyster-shell.....	340
, San José.....	340
Scarlet oak.....	187
School-yards, decoration of.....	141
Schwedler's maple.....	165
Scope of home ornamentation.....	2
Scotch elm.....	188
Scouring-rush.....	315
Screens, trees for.....	64
Seed, grass.....	37
, quantity per acre.....	38
, sowing grass.....	39
Seeding lawn before planting trees, etc.....	37
, time for.....	38
Selection of varieties of trees, etc.....	51
Settling the soil.....	37
Shadbush.....	169
Shed-room in outbuildings.....	27
Shelf-room in house.....	27
Shrubs, evergreen.....	249
, list of varieties.....	215
, ornamental.....	214
, planting and pruning.....	84
, preparing land for.....	82
, renovating old.....	106
, two methods of grouping.....	83
Siberian arbor-vitæ.....	212
Silver-thorn.....	225
Silver-bell.....	227
Silver maple.....	160

	PAGE
Silver poplar.....	176
Silvery actinidia.....	263
Size of fruit-garden.....	351
Slender deutzia.....	223
Slippery elm.....	159
Slope of land for fruit-garden.....	251
Snapdragon.....	296
Snowball, common.....	241
, Japanese.....	241
Snowberry.....	239
Soil for aquatics.....	308
fruit-garden.....	352
ornamentals.....	10
Spider, red.....	338
Spirea, Anthony Waterer.....	239
, bridal-wreath.....	235
, Bumald's.....	236
, golden.....	235
, lobed.....	236
, Thunberg's.....	238
, Van Houtte's.....	239
Spot, rose-leaf.....	347
Spraying-pumps.....	327
Spruce, Colorado blue.....	206
, Norway.....	205
, weeping.....	206
, white.....	205
St. John's wort, shrubby.....	229
Stone walls, removing.....	118
Strawberry.....	371
, cultivation and care of.....	371, 372
Strawberry-bed, plan of.....	371
Strawberry-tree.....	225
Street- and avenue-trees.....	155
, list of.....	155
Striped nelumbo.....	309
Strongly marked features, preserve.....	11
Subtropical plants.....	300
Sugar-maple.....	160
Sulphate of copper.....	325

	PAGE
Sulphate of copper solution.....	325
Sumac, cut-leaved.....	232
stag-horn.....	235
Japanese.....	235
Sunflower, hardy.....	291
Sunlight in all rooms.....	25
Surface of roads.....	121
Surface- and sub-drainage.....	102
Sweet birch.....	170
gum.....	179
pea.....	298
pepper-bush.....	221
Sycamore or plane-tree.....	176
leaf-blight.....	347
maple.....	166
Syringa.....	230
Systems of landscape gardening, geometrical.....	5
, natural.....	5

T

Tartarian maple.....	167
Tender bedding-plants.....	295
climbing plants.....	299
foliage and flowering plants.....	295
water-lilies.....	309
ThurLOW's weeping willow.....	195
Transplanting hardy herbaceous plants.....	107
trees and shrubs.....	59
Trees, arrangement or grouping of.....	62
, avenue or street.....	155
, avoid too close planting.....	67
, characteristics of.....	45
, classification of varieties.....	153
, covering wounds on.....	51
, deciduous, improving.....	106
, description of.....	153
, digging for planting.....	56
, distance for planting.....	52
, evergreen.....	203

	PAGE
Trees, evergreen, transplanting and pruning.....	203
for screens.....	69
for shelter.....	63
, improving old.....	47
, keeping up an aftergrowth.....	62
, nature as a guide.....	67
, plan of arrangement.....	45
, planted along narrow roadways.....	53
, planting before seeding lawn.....	39
, preparation of soil for planting.....	55
, pruning and transplanting.....	57
, pruning old.....	47
, rules for grouping.....	68
, selection of varieties.....	51
, size of trees to plant.....	52
, time for planting.....	54
, watering and mulching.....	61
with colored foliage.....	198
cut foliage.....	195
round heads.....	164
weeping forms.....	190
Trumpet-creeper.....	264
Turk's cap lily.....	283

U

Umbrella magnolia.....	179
Use of cellar.....	23

V

Van Houtte's spirea.....	239
Variegated cut-leaved maple.....	196
dogwood.....	221
flag.....	314
Japanese plume-grass.....	318
oak.....	187
weigela.....	223
Varieties of apples.....	360
blackberries.....	368
cherries.....	366
currants.....	370

	PAGE
Varieties of evergreen shrubs.....	250
grapes.....	367
peaches.....	363
pears.....	362
plums.....	364
quinces.....	365
raspberries.....	369
strawberries.....	372
Vasey's azalea.....	216
Virgin's bower.....	258

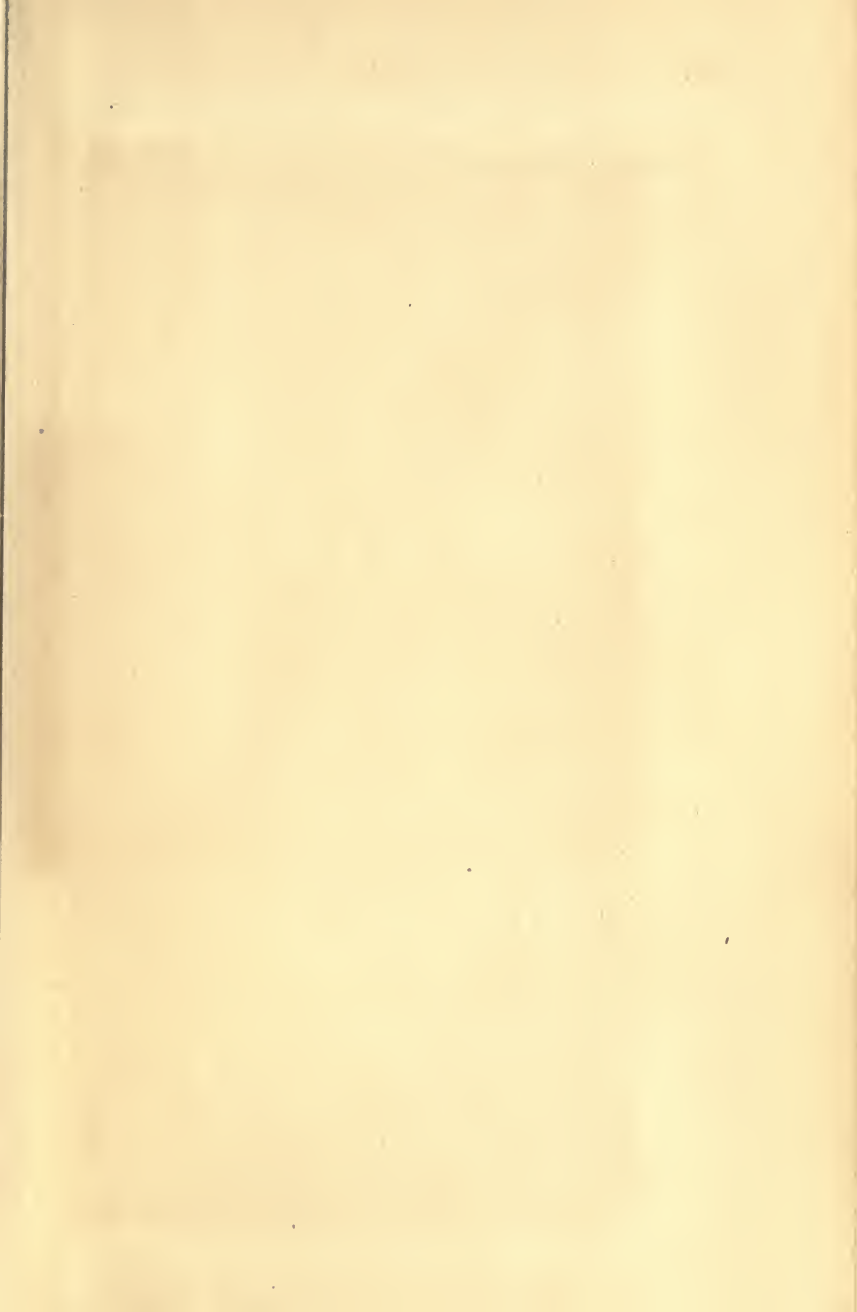
W

Walks and drives	293
bordered with turf.....	39
, construction of.....	101
, direction of.....	98
, how to obtain curves of.....	99
, importance of.....	95
, improving old.....	112
, location of.....	97
, width of.....	98
Walls and fences, removal of.....	133
Walnut, black.....	162
Water, good supply of.....	9
, open outlet of lakelet.....	15
, underground outlet of lakelet	15
Water-hyacinths.....	313
Water-lilies, European.....	311
, hardy.....	309
rose-flowered.....	309
yellow-flowered.....	311
, tender day-blooming.....	312
night-blooming.....	312
Water-plantain.....	315
Water-poppy.....	314
Watering trees after planting.....	61
Weeping ash.....	193
birch, cut-leaved.....	190
, Young's.....	190
dogwood.....	192

	PAGE
Weeping elm, Camperdown.....	195
golden-bell.....	227
Japanese cherry.....	192
maple, Wier's cut-leaved.....	190
mulberry.....	194
trees, list of.....	190
willows, Babylon.....	194
, purple.....	195
, Thurlow's.....	195
"Well" about roots of trees.....	32
Whale-oil soap.....	323
White clematis.....	259
Japanese nelumbo.....	309
oak.....	185
pine.....	209
spruce.....	205
wistaria.....	263
White-fringe.....	232
-leaved linden.....	183
Width of roadbed.....	123
Wild cucumber.....	299
Wild rice.....	315
Winter protection of evergreen shrubs.....	249
roses.....	242
strawberries.....	368
Wistaria, Chinese.....	263
, white.....	263

Y

Yellow roses.....	244
Young's weeping birch.....	190
Yucca or Adam's needle-and-thread plant.....	292



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